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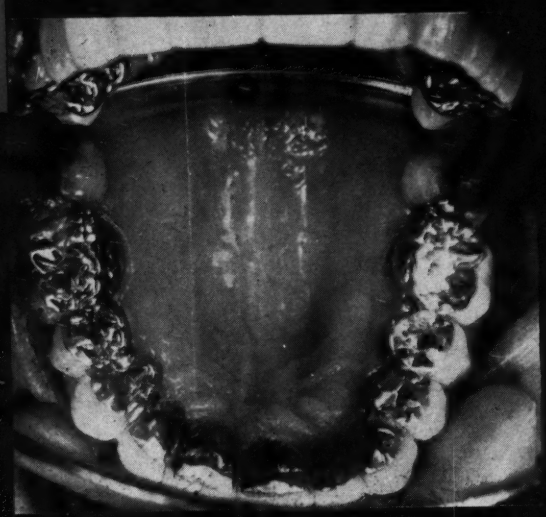

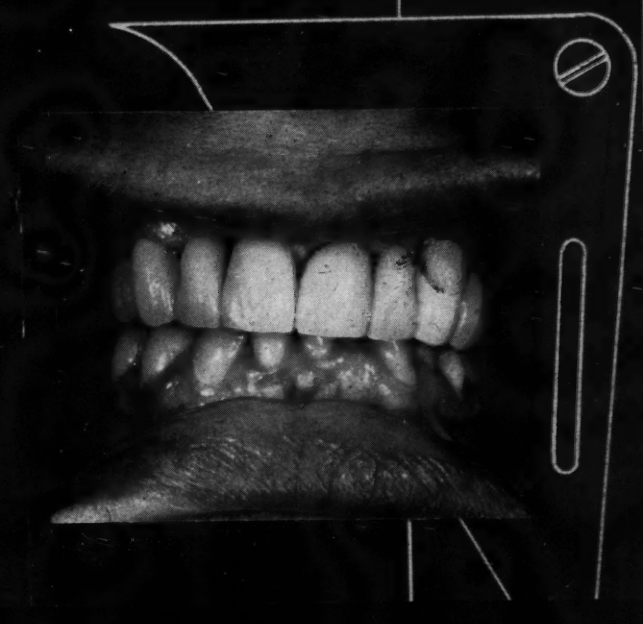

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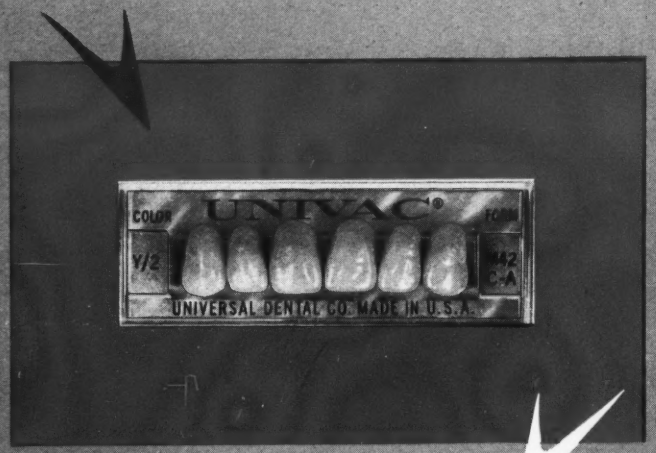

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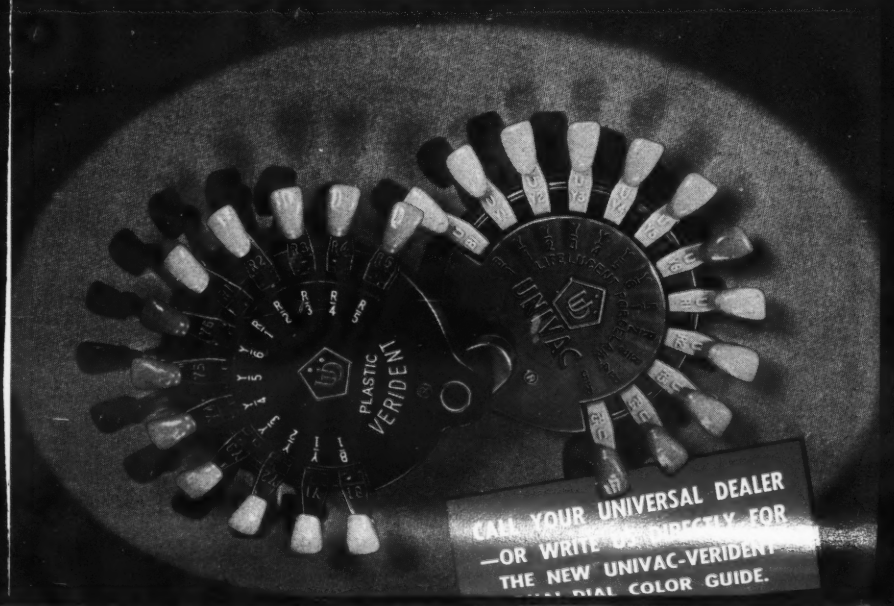

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Combination ROTARY *and* ULTRASONIC *Technique in Tooth Preparation*

IRVING A. GERBER, A.B., D.D.S., New York

DIGEST

A basic technique in the successful practice of dentistry is the preparation of the individual tooth for the reception of a restoration. The introduction of the higher speeds, diamond stones, carbide burs, and tooth lubrication has made this operation easier for the dentist and more comfortable for the patient. A new tooth-cutting apparatus must demonstrate its usefulness in simplicity and efficiency in attaining one or both of these aims. This article describes an effective technique employing a combination of rotary and ultrasonic methods in general practice.

Ultrasonic Dental Machine Essential Instrument

Lefkowitz, Robinson and Postle[1], as a result of an extensive survey of Cavitron* users, have published the conclusion that the ultrasonic dental machine is "another essential instrument to be added to the dental armamentarium." It was employed as an auxiliary implement to their equipment by 66 per cent of the users.

Combination Technique Favored—Three years of extensive trials with all types of tooth-cutting apparatuses has demonstrated that the most gratifying results are obtained by the judicious use of a combination technique for most tooth preparations.

Best Features of Both Instruments Employed—The rotary and ultrasonic systems complement one another, making it possible for the dentist to employ the best features of each instrument. Some operations, difficult to perform with rotary tools, are simple with the ultrasonic mechanism. In other applications, however, the rotary remains the instrument of choice. This is particularly true in gross tooth reduction for crowns.

Basic Principles Of the Method

The principles of ultrasonic tooth cutting have been investigated and reported.[2] Through the medium of the abrasive particles, which actually do the cutting, the ultrasonic tip is in continuous contact with the tooth. Thus the operator retains the familiar tactile sense at all times.

Tips May be Altered—Tips of various sizes and shapes are provided, and may be altered by grinding with a heatless stone.

Technique Quickly Mastered—A short trial period devoted to the preparation of cavities and crowns on extracted or ivorine teeth, will demonstrate how quickly and easily the technique can be mastered.

Safety Factors Established—The safety of the instrument has been established. Zander[3] reports pulp reaction similar to that observed after the use of conventional instruments.

Tips Frequently Used—Experience has led the author to limit the number of tips used to five: No. 2, the small rectangular boxing tip; No. 10, called a slicer, but used as a large boxing tip; No. 15, the off angle tip similar in size to the No. 2 tip. Also the Nos. 31 and 32, the medium, and large cylinder tips are useful.

Cutting Projected from Leading Edge—A unique difference of the ultrasonic tip is that its most effective action in cutting is projected from the leading edge, producing a cut exactly the same dimension as the tip itself. This has been called a "thrusting" action.

Procedure in Class II

The Black Class II preparation is the most widely used intracoronal preparation in dentistry. There are many methods for starting the proximal box-form for this procedure. None is so simple as the approach with the ultrasonic instrument. Postle[4] has stated that the accomplishment of this preparation is easier and more relaxing for the dentist than with any other instrument. Hartley[5] in reporting on the "annoyance" factor to the patient, states that the ultrasonic instrument is the least objectionable.

Procedural Steps—For the Class II preparation the following steps are taken:

(1) A rectangular tip, No. 2 or No. 10, whichever is approximately three-quarters of the buccolingual width of the tooth, is placed on the occlusal surface just inside the marginal ridge (Fig. 1).

(2) The shaft is held parallel to the long axis and directed so that the end of the cut at the gingival floor will be positioned well inside the body of the tooth (Fig. 2).

*Product of Cavitron Company, Long Island City, New York.

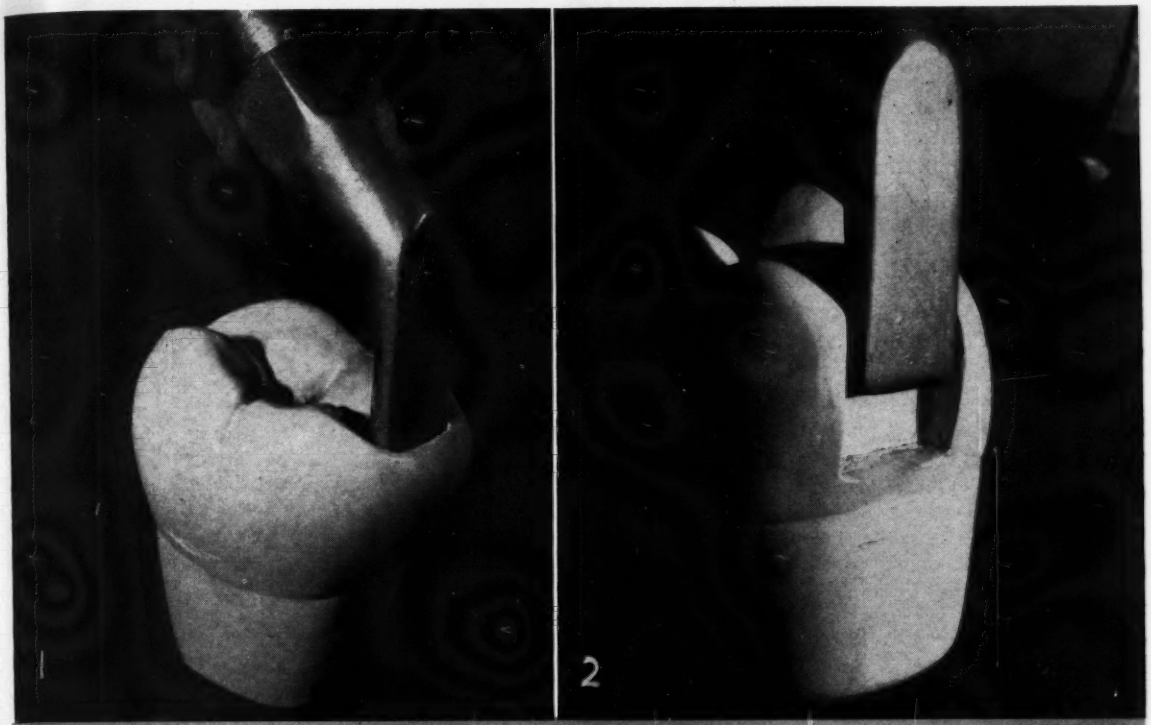
[1]Lefkowitz William; Postle, H. H.; and Robinson, B. H. G.: Clinical Survey of Ultrasonics, Dent. Surv. **33**:1465 (Nov.) 1957.

[2]Oman, Carl, and Applebaum, Edmond: Ultrasonic Cavity Preparation—Progress Report, JADA **50**:414-417 (April) 1955.

[3]Zander, Helmut A.: Effects of Ultrasonic Cavity Preparation Upon the Pulp, J. Pros. Dent. **8**:137 (Jan.) 1958.

[4]Postle, Harry H.: Ultrasonic Cavity Preparation, J. Pros. Dent. **8**:153 (Jan.) 1958.

[5]Hartley, Jack L.: Comparative Evaluation of Newer Devices and Techniques for the Removal of Tooth Structure, J. Pros. Dent. **8**:170 (Jan.) 1958.



1. *Start on Class II preparation.* 2. *Proximal box-form completed with tip.*

(3) If the area of caries is merely a circumscribed break in the proximal wall, this one application will normally complete the box form.

(4) If the caries is more extensive than the width of the tip, the box may be extended buccolingually by inclining the tip so that its edges will cut and extend the lateral walls.

(5) The step portion of the preparation is started with the same tip, placed at right angle to its previous cut (Fig. 3).

(6) A cut is made on the occlusal and extended to join the proximal preparation.

Technical Refinement—The steps described complete the use of the Cavitron in the Class II preparation. In some cases, it will be a suitable preparation. In a majority of cases, however, it is a refinement to apply a barrel or cylinder diamond stone in the angle handpiece to achieve a continuous outline, and produce parallel cavosurface walls and angles. Completion of the preparation is accomplished with hand instrumentation for possible overhanging enamel, and gingival bevel.

Preparation of Full Crown

The emphasis placed on the fully covered tooth has been justified by its wide use as an individual crown, and its acceptance as the preferred retainer for fixed bridge construction. This makes its preparation one of the most necessary skills of the general practitioner.

Exacting Procedure—The preparation of the full crown, anterior and posterior, with complete shoulders, is one of the most exacting procedures in modern dentistry. The proper preparation of the shoulder is the detail upon which the success or failure of the entire restoration depends. The correct execution of this step is difficult with stones, burs, and hand instrumentation.

Importance of Shoulder—While it is a fact that the posterior "shoulderless" full crown preparation is extensively used, it is my belief that many of the difficulties encountered in overextended, underextended, and poorly adapted crowns are due to the lack of a definite finishing line. When a shoulder is present, all doubt is removed.

The use of the ultrasonic tip makes shoulder preparation easy to achieve, from the wide "shelf" of the anterior crown for a porcelain restoration, to the narrow chamfer required for some atypical posterior teeth.

Initial Use of Rotary Instruments—The rotary instruments for use in the anterior crown preparation are used in the straight handpiece. They are the mounted diamond wheel stones ½ inch and ¾ inch in various widths; mounted diamond discs, perforated, ¾ inch and ⅞ inch; cup-shaped discs, outside cutting, ¾ inch and ⅞ inch; and the depressed center mounted stones described by Leff[6] ½ inch and ¾ inch. These are all large diamond stones. The use of ultra-high speeds is neither necessary nor desirable as the peripheral speeds attained are sufficient for rapid cutting. Air-water spray is used at all times in rotary operations.

Steps Taken with Rotary Instruments—(1) Adequate incisal enamel removal is accomplished with one cut

[6]Leff, Alexander: New Concepts in Full Coverage, J. Pros. Dent. 5: **392**-400 (May) 1955.

3. ***Starting occlusal preparation.***

4. ***Appearance of tooth at completion of rotary instrument use.***

of the "Leff" stone. The same instrument may then be applied to the labial and lingual surfaces if large bulk removal is required for the clearance of casting or porcelain.

(2) In cases of thin, delicate teeth, the rounded wheel stones are preferred. In either case, no rotary preparation is made on the tooth at the gingival third.

(3) The proximal surfaces are prepared with the strobe diamond discs, using the safe-sided cup-shaped disc for the distal surfaces, and the flat disc for the mesial: (a) These are carefully applied at a direction designed to produce a slight taper. (b) They are carried apically to create a shoulder on the proximal surfaces at the gingival margins. (c) It is not essential at this time that they be carried below the free margin of the tissue (Fig. 4).

Use of Rotary Handpiece Completed—These steps complete the use of the rotary handpiece in the full crown preparation. It will be observed that at this stage, a roughly prepared tooth results which is square or rectangular, with sharp corners. There is gingival preparation only on the poximal aspects. The gingival third of the tooth, labial and lingual, is unprepared.

Full Crown Preparation Completed with Cavitip—The following steps are taken:

(1) The No. 5 or No. 10 cavitip is selected. It should be one-half to one-third the width of the part of the tooth remaining after proximal preparation.

(2) The edge of this tip is placed on the labial surface at the junction of the cut and uncut surfaces, parallel to the long axis of the tooth (Fig. 5).

(3) A gentle application, pulpally and apically, will produce the initial cut.

(4) Using this cut, which is actually a ledge into the previously unprepared gingival third of the tooth, as a starting point, the cut is carried gingivally to a point under the free margin of the soft tissue (Fig. 6).

(5) The same procedure is repeated on the adjacent labial surfaces until a complete shoulder is formed on the labial surface. This is usually completed in three cuts.

(6) The lingual surface is treated in exactly the same way. The result is a tooth with shoulders prepared on the labial, lingual, and proximal surfaces, leaving the four corners as yet unprepared, either in the body of the tooth, or at the gingiva.

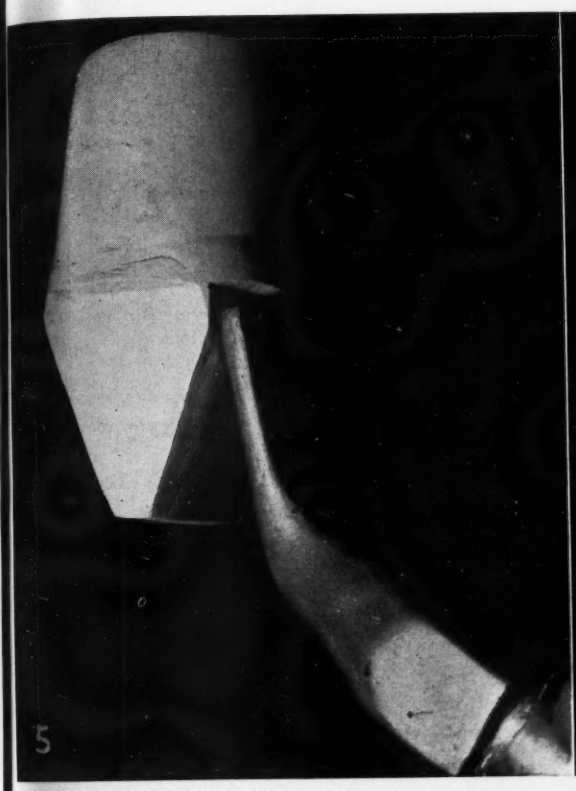
Steps in Preparation of Corners—

(1) To prepare these surfaces, the same tip is placed on the prepared incisal edge catercornered to the angle of the corner.

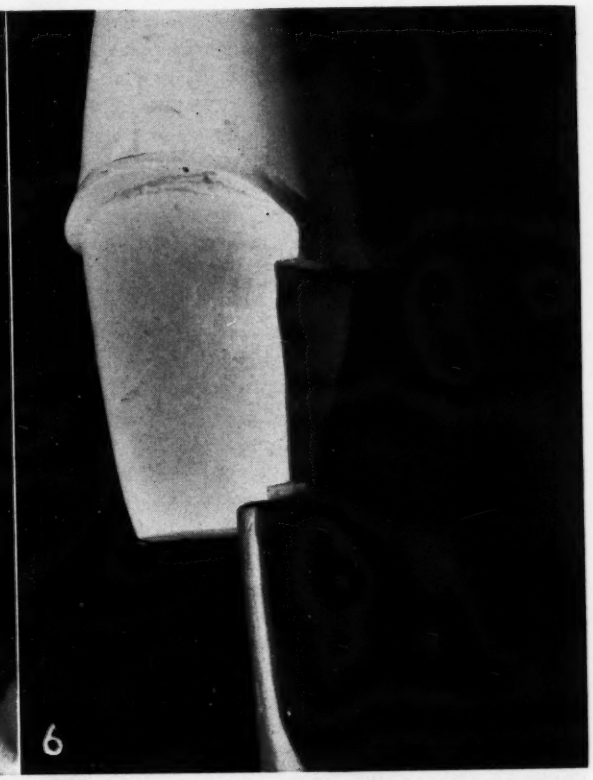
(2) The cut is started at this point and carried all the way to the gingiva. (Fig. 7).

(3) The four angles are each prepared in a similar manner.

(4) Using the flat surface of the tip, a gentle planing and polishing action is directed at the irregularities at these angles. This rounds the angles in an acceptable manner.

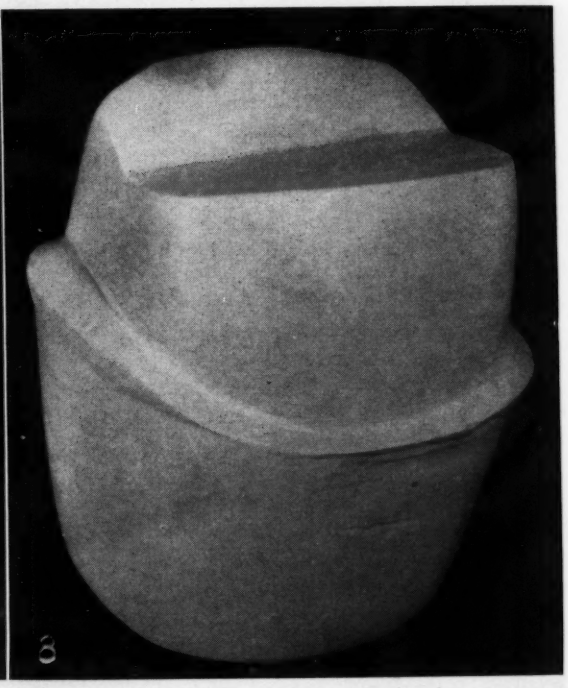


5. *Start of shoulder for crown.*



6. *Start of corner preparation.*

7. *Completion of shoulder, labial and proximal.*



8. *Completed preparation, molar.*

(5) The same tip may then be carried into the proximal surfaces, depressing the shoulders previously prepared.

Cylindrical Tip Used to Smooth the Shoulder—It will be found that occasionally the shoulders prepared in this way are not completely continuous with one another. If so, a cylindrical tip, with diameter the same as the width of the shoulder is used to smooth, connect, and even the shoulder. This tip will cut apically and laterally. It may be used to carry the shoulder further under the tissue, or merely to eradicate irregularities of contour. The ultrasonic tip will not lacerate soft tissues at the gingival, ensuring good vision in a bloodless field.

Preparation of Posterior Tooth for Full Crown—This is accomplished in a similar manner with the same selection of tips. The rotary procedure differs in that the occlusal surfaces are removed with the "Leff" stone and normal contours of the occlusal reproduced with smaller round diamond stones (Fig. 8).

Additional Uses

The variety of cutting tips, their versatility and adaptability will suggest other uses to the operator. The following applications have been found extremely valuable:

(1) In Class I and V preparations, the extent and softness of the caries determines whether the ultrasonic tip should be used. If the cavity is merely a break in the surface with little underlying soft material, a rectangular tip will prepare the cavity in sound tooth structure with little effort. If there is extensive soft caries, the preparation is more easily done with excavators, stones, and burs.

(2) Proximal retention grooves are prepared with cylindrical tapered tips for three-quarter crowns. Paralleling and deepening grooves is easier than with tapered burs or stones.

(3) Auxiliary anchorage pits can be made with small cylindrical tips.

(4) Occlusal rests may be easily made with a worn, rounded tip. They will form a perfect, round, smooth, polished seat.

(5) Box-forms, for the reception of female attachments, may be cut into the proximal of any tooth after the completion of the full crown preparation.

(6) Occlusal and lingual openings into pulp chambers in endodontic techniques may be easily made without pressure.

Precautions to be Taken

Certain precautions are necessary in the use of the Cavitron instrument.

(1) The care of the adjacent tooth is important. Any tooth surface will be cut when it is touched by the tip in motion with the abrasive flowing. For the novice, it would be well to protect the adjacent teeth with a metal matrix. After some experience when it is found that the matrix is not being etched, protection is no longer necessary. The spray of abrasive will not cut.

(2) Cavitron operation requires direct vision. A slight reorientation of the chair and head position makes this no great problem.

(3) A substitution of the offset tip in place of the rectangular tip is required in some positions where the hand and the handpiece obstruct a clear field.

(4) A plastic apron should be used for patient clothing protection at all times.

(5) A suction apparatus with a saliva ejector tip is recommended.

(6) Maintenance of the unit consists of changing tips, and replenishing and checking abrasive in the pumping chamber.

Summary

A method has been described to enhance the ease with which tooth preparation may be made. It has been shown that the combined rotary and ultrasonic technique may be effectively utilized in the general practice of dentistry. It has been demonstrated that no radical change is required in the conventional procedures, but rather that the addition of the new instrument will reduce the strain on the operator in the successful completion of some of the more difficult types of tooth preparation.

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An Evaluation of the UNILATERAL IMPLANT: *A Five-Year Report*

LEONARD I. LINKOW, D.D.S., Kew Gardens Hills, L. I., N. Y.

DIGEST

Much experimentation has been undertaken in the technique of the dental implant. Intraosseous dental implants have been tried, the results of which have not been entirely encouraging. The subperiosteal implant described by Goldberg and Gershkoff,[1] Weinberg,[2] and Lew[3] demonstrated in clinical experience over the past number of years the possibilities in this technique for fixed bridge construction procedure. In this article the author reviews some of the problems most often encountered by the operator in this technique, and in particular discusses the reasons for the failures which have occurred in his own experience in the application of the technique since his report on this subject several years ago.

Considerations Involved

1. *Physical Conditions*—A suitable implant material[4] should have the following properties: it should be (a) noncorrosive, (b) nonirritating, (c) inert in human tissue, (d) light in weight but strong, (e) resistant to resorption, (f) noncytotoxic to salt, and (g) it should appear radiopaque on roentenograms (Fig. 1).

2. *Surgical Factors* — To attain prompt and perfect healing the following principles should be observed:

a. The incision line should not be on, near, or terminate on the peripheral border of the base of the implant as it would interfere with the healing tion of tissues and to resumption of cell function.

b. Sutures should be placed as close to the protruding abutment or abutments as possible to avoid any possible infection (Fig. 3).

c. Immobilization of the implant should be made immediately after insertion by means of screws or splints (Fig. 4).

d. Antibiotics should be introduced the day before, on the day of surgery, and the day after insertion of the implant to prevent possible infection which might interfere with normal healing.

3. *Medical and Biologic Considerations*—It is known that Vitallium® is of a passive nature to human tissue. Since the tissue binds itself so tenaciously to this metal, however, it might well be that it is not completely passive but rather that it indirectly stimulates the tissue cells through the reestablishment of function. Because it is present the metallic appliance cannot remain completely passive. Passivity, therefore, must mean more than corrosion resistance in body fluids and noninterference with normal tissue growth. It must also signify a stimulus to adaptation of tissues and to resumption of cell function.

Inorganic Compounds: It is also known that acids, bases, salts, and basic oxides are the most frequent inorganic components in metabolic changes. These are identified as electrolytes.

Human Body A Conductor: Its fluids (blood, lymph, and interstitial fluids) contain electrolytes in aqueous solutions which bring about the formation of ions. These ions, which represent electrical conductivity, become active when exposed to the action of an electric field formed by the difference of potentials or voltage which exists between heterogeneous substances (metals) and body fluids (electrolytes).

Results of Alteration of Ionic Balance: Whenever the ionic balance is altered, for example, by the insertion of a metallic appliance, an electrogalvanic current is produced resulting in the production of metallic salts. To place a corrosive metal into an electrolytic tissue fluid would, therefore, create a wet cell which would destroy this tissue.

Phenomenon of Galvanic Action: The amount of tissue damage is said to be proportional to the amount of galvanic action taking place between the tissue fluid and the metal. It is this galvanic action that is believed to destroy the tissue. This so-called

1. ***X-ray view of implant showing that it is radiopaque on roentgenograms.***

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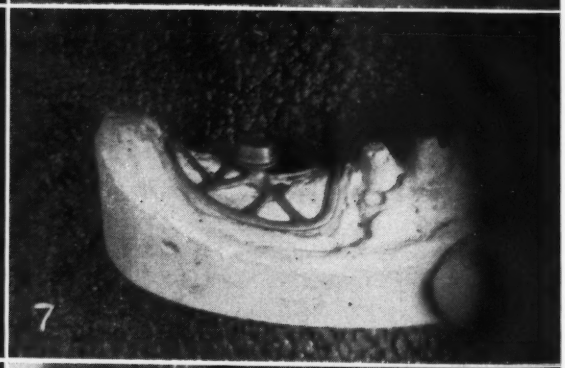
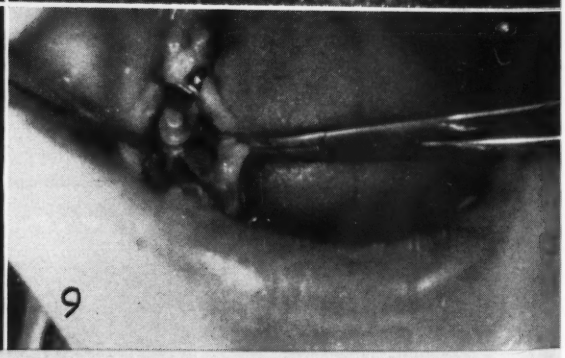
[1]Goldberg, Norman I., and Gershkoff, Aaron: The Lower Implant Denture, DENTAL DIGEST **55**:490-494 (November) 1949.

[2]Weinberg, Bernair D.: Subperiosteal Implantation of a Vitallium Artificial Abutment, JADA **40**:549-550 (May) 1950.

[3]Lew, Isiah: Implant Denture: A Simplified Upper Technique Using Immediate Prosthesis DENTAL DIGEST **58**:10 (January) 1952.

[4]Marziana, L.: Dental Implants and Implant Dentures, Their Theory, History and Practice, Internat. D. J. **4**:459-478 (June) 1954.





2. *Shows tissue retracted after incision is made.*

3. *Showing sutures made as close to the implant abutment as possible in order to avoid infection.*

4. *Temporary acrylic splint used to immobilize the implant.*

5. *Shows meshlike structure of base of implant.*

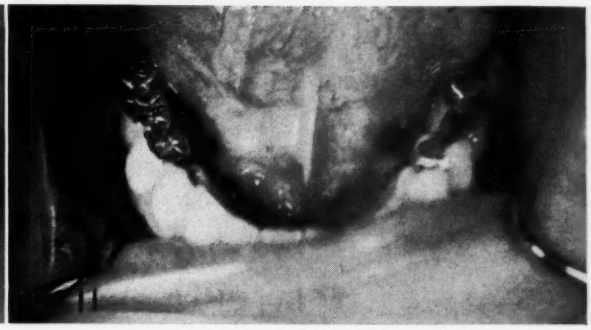
6. *Shows peripheral extension of the implant buccally and lingually.*

7. *Shows truncated cone which joins the implant base with the implant abutment and which is only as thick as the overlying tissue. Also shown is the complete shoulder around it to allow for porcelain jackets as well as veneer crowns.*

8. *Model showing occlusal height between implant abutment and opposing tooth.*

9. *Shows insertion of implant.*

10. ***Showing how periosteum grew into mesh of implant and held it in place.***



11. ***Showing fixed bridge cemented over implant.***

"phenomenon of galvanic action" is the basic resason for the failure of some metals while others have succeeded.

Vitallium is Completely Inert: It is believed that galvanic action does not occur when this metal is inserted in human tissue and is allowed to remain immersed in its fluids.

4. *Prosthetic Requirements* — The implant should be designed according to the following specifications:

(1) Shape: The base of the implant should be of a meshlike structure (Fig. 5). The buccal peripheral border should end, wherever possible, on the area of most density of the bone. Lingually, it should end slightly beyond the crest of the ridge and should seat flush into a lingual groove created in the bone in order to take up the thickness of the thin and tightly stretched tissue which predominates in the area (Fig. 6).

(2) Truncated Cone: This cone which joins the implant base with the implant abutment (Fig. 7) should be only as high as the thickness of the mucosa through which it pierces.

(3) Implant Abutment: This should be constructed so that it could accomodate porcelain as well as gold veneer restorations. A shoulder should extend around the gingival border of the entire stump (Fig. 7). The height of the abutment should allow for enough space to permit a crown to be placed over it (Fig. 8).

5. *Consideration of Retention* — Many solutions have been applied to solve the problem of retention:

The Use of Screws: Goldberg and Gershkoff[1] in their early experiments used screws but later realized that the screws were not the most important factor in holding the appliance and at times some of the screws loosened and exfoliated.

Periosteal Retention: Weinberg[2] who does not use screws in his unilateral implants, stresses the fact that the periosteum will hold the mesh of the implant and that new tissue will form in the mesh (Figs. 9, and 10).

The Fixed Bridge: A bridge which is constructed to fit over the implant abutment and extend anteriorly to at least one tooth abutment, should certainly provide retention of the implant by immobilizing it (Fig. 11).

Shape of Edentulous Bone Area Where Implant is to be Seated: The structural design of this area has a definite bearing on the retention of the implant.

Measures to Increase Retention: A lingual horizontal groove can be made running mesiodistally where the peripheral border of the implant will extend. "Alveolar crest notches" may be made for firmer retention of the implant.

Importance of Impression Technique: All the measures enumerated will be unavailing if the original bone impression was not exact. This impression is therefore probably the most important step for success.

Immediate Insertion: After insertion of the implant an acrylic splint is inserted to aid immobilization.[3]

Contributing Factors In Failure

1. Faulty technique is involved as the cause in all kinds of failures in all phases of dentistry and includes errors made during the entire procedure beginning with a poor impression, inaccurate impression boundaries, and including failure to balance the bite at completion of the technique.

2. Presence of contraindications in certain patients such as diabetes, or a blood dyscrasia, will result in imperfect healing of tissues or in rapid bone resorption as noted in the presence of osteoid disease.

3. The character of the surrounding tissue such as the tight fit of the tissue on the lingual side of the ridge crest to the bone is a factor. The fact that the border of the implant usually pierces through in this area indicates that this is generally a vulnerable area.

4. Future resorption of bone underneath the base of the implant is a constant threat to the implant as bone will always have a tendency to resorb when used as a "bearing" surface. This tendency is noted in the problem of the full or partial denture (Figs. 12, 13, 14, 15, 16, 17, and 18).

Postoperative History In Implant Cases

In 1953, the author inserted seven unilateral lower implants. The following is a report of subsequent conditions:

Implant Removed—After one year,

the first implant was removed. Observation showed (1) mobility, (2) lingual and mesioproximal tissue perforation, and (3) looseness of the anterior abutment, which was not too strong to begin with.

Reasons for Removal — (1) Poor operative technique, (2) poor patient choice, and (3) healing never completely occurred over entire implant base.

Patient's Reaction — No pain was felt but the patient complained that when biting he felt as if he were biting into "mud." The soft tissue had grown between implant base and bone.

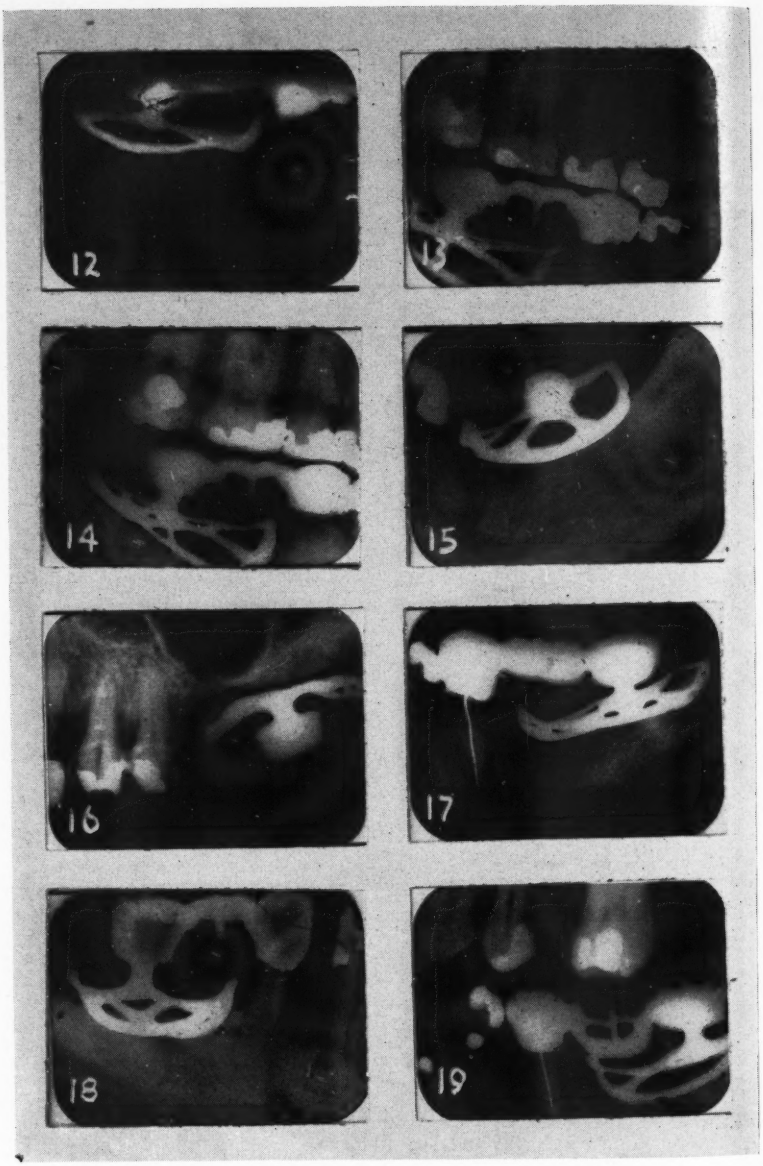
Additional Implants Removed—In 1956 and 1957 five others were removed; one is still intact.

Reasons for Removal — (1) Bone resorption under implant, (2) lingual perforation of implant.

Technique Improved—The implant structure on these six cases seated exactly into place on the bone upon insertion, perfectly fitting splints were constructed and fitted, and there was in a short time complete immobilization of the structure.

Lingual Perforation — Within two to two and one-half years on all six cases lingual perforation occurred, even before any visual bone loss could be seen on x-rays. However, the implants still remained immobile.

Lingual Border Exposed—Some of the patients complained of a feeling of uneasiness with the lingual peripheral border of the implant being exposed to the tongue and saliva. These implants were therefore removed. One other case had loosened, but only after the lingual border became exposed. At that time the soft tissue rapidly oozed its way under the base of the implant.



12, 13, 14, 15, 16, 17, and **18.** ***X-rays showing bone resorption under implants over a period of five years.***
19. ***X-ray view showing start of resorption.***

20. ***Shows new lingual finger design of implant to help prevent lingual perforation.***

Final Implant has Perforated—One remaining implant exists in place. It too, however, has perforated the lingual tissue and there is evidence of bone resorption (Fig. 19).

Tissue Adheres to Implant Meshwork—On removal of all the other cases, however, the soft tissue was found to be tenaciously fixed to the meshwork of the implant and in most cases had to be actually severed in many areas to free it.

Chief Causes of Failure

The two main causes of failure in the opinion of the author are the following:

1. Tissue perforation on the lingual, since even with lingual grooves (which should not be disregarded) the implant perforated the tissue in

this area. It is now believed that it would be advisable to change the anatomy of the lingual peripheral border of the base of the implant: Instead of having the cross struts flow into the continuous lingual inferior border, eliminate completely this border and merely have finger-like structures extending over the remainder of the ridge and ending in predetermined notches and grooves on the lingual surface (Fig. 20). In this manner the lingual border can be cut off from the rest of the implant structure, and as it is not part of a continuous border such as exists in the implant structures as constructed at present the tissue would be able to regrow more easily.

2. Bone resorption will always be an important cause of failure. However, it might be possible to alter this resorption by frequent periodic balancing of the teeth to help prevent lateral dislodgement of the implant.

Conclusion

It is believed that despite the handicaps described implantations of metal into human tissue for tooth retention should be regarded as a highly skilled technique that fills an important role in the dental field today and will be even more generally recognized in years to come.

71-17 150*th Street*

Artificial Respiration

Test Made

The mouth-to-mouth method of artificial respiration was tested with the subject on a hard table and on the floor. One advantage of the method is that the operator has both hands free to hold the lower jaw forward and to keep the mouth open, thus ensuring a clear airway; at the same time the hands can be used to close the patient's nostrils.

Method Used—1. The operator places his own mouth well over that of the patient and, at first vigorously, at later less vigorously, blows out his own expired air until the patient's chest expands.

2. The operator then removes his mouth and allows expiration to occur naturally by elastic recoil.

Advantages—It is claimed that this method can be used on anyone, that it can be maintained for long periods without fatigue or dizziness, that it easily achieves a ventilation of 1000-1500 cubic centimeters at 12-20 respirations a minute, and finally that it is easily taught and learnt. Occasionally air may enter the patient's stomach; but it can be removed by compression of the abdomen, and it does not interfere with the respiratory process.

Disadvantages Overcome — The main objection to the mouth-to-mouth method is esthetic, and to overcome this a simple S-shaped tube has been designed which can rapidly be inserted down to the pharynx; the operator can then expire through the outer end of this tube, giving oropharyngeal respiration. The ventilation by using the tube is just as good as in the direct mouth-to-mouth method. Insertion of the tube is said to be easy, to be soon learnt, and to involve negligible delay in starting resuscitation. Further the tube is small and can easily be carried in the pocket.

Comment

Mouth-to-mouth resuscitation can be used on patients of all ages, but it is emphasized that for infants the operator must not expire vigorously lest he rupture alveoli; little more than an expiratory puff is required.

Adapted from Annotations, *Lancet* No. **7034**:1322 (June 21) 1958.

Routine Exposures to X-Rays

Query

A 6-YEAR-OLD child visits her dentist three times a year and has a complete set of dental roentgenograms taken each time. Is the amount of exposure in this procedure likely to be harmful?

Discussion

The question does not permit a simple unequivocal answer. Numerous studies have been made concerning the exposure of the mouth, teeth, and various portions of the body during dental roentgenography. The type of machine used, the type of film used, and many other factors enter into the determination of the radiation dose. With the best techniques of dental roentgenography, the maximum exposure in the mouth for a full mouth study may be less than 20 r. Some units may deliver as much as 150 r per full mouth study. This consultant advises against three exposures a year that deliver as much as 150 r per exposure, but it should be perfectly safe to make three full mouth studies if the exposure is less than 20 r per study.

Adapted from Queries and Minor Notes, *Journal of the American Medical Association* 161, No. **15**: 1518 (August 11) 1956.

Investigation of Neuropathologic Manifestations of Oral Tissue: INHERITANCE *and* EMOTION *as Related to Tooth Structure Breakdown*—Part Four

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San Francisco

DIGEST

This is the concluding installment of a four-part report based on an investigation which began in 1951 and is being continued at the present time. The authors have had no reason to change their original assumption regarding dental pathologic processes, although as the study proceeds they are extending the scope of their observations. In this final article they discuss the phenomenon of pulp changes and describe the various approaches to treatment which they have applied successfully.

Long-term Nonreparable Pulp Phenomena

While the pathologic process previously described is capillary fragility, in this calssification fragility is not a factor. Again the underlying cause is genetic and the accelerating factor emotional. The chain of pathologic processes is exclusive of cavitations and periodontosis.

Similarities in Histopathologic Changes—In this situation the dental pulp attempts to survive under extremely adverse conditions. Sections made for study of the dental pulps of many hundreds of cases all show consistent similarities for each stage of advancing histopathologic changes.

Emotional Factors Involved—These conditions are noted in the type of patient who has cycles of depression and stimulation, but the curves are extended during the depressive cycles and shortened during excitement. Such pathologic change found among hospitalized mental patients had its inception before hospitalization. The percentage of this type of condition among general office patients from 21 years and on, is in excess of 50 cases out of 100 examined. Sex presents little differentiation: the problem is about equal among male and female.

Variation with Age — Ages below adolescence show less pulp pathology of this kind due to the fact that pulp chambers are larger in volume and contain pulps younger and better nourished. On the other hand this pathologic change is not inevitable with advancing age. Many aged patients have roentgenologically clear pulps and, conversely, many patients in their twenties and thirties show pulp calcific inclusions during x-ray study. It is evident that with the advancement of emotional tensions common today, catabolic cell synthesis and pathologic sequences result in cell mineralization and congestion on a basis of petrification, especially in mesendermal structures.

Phases in Pathologic Process

The pathologic process proper may be classified into two phases: (1) that phase in which microtoming of the pulp sections is possible, and (2) that phase in which pulp section and their calcific masses must be ground or decalcified in order to make study slides.

The First Stage — The pulp cells gradually undergo defensive changes in this stage and, in common with capillary fragilities in these pathologic changes the endothelium of the pulp capillaries are the structures most vulnerable.

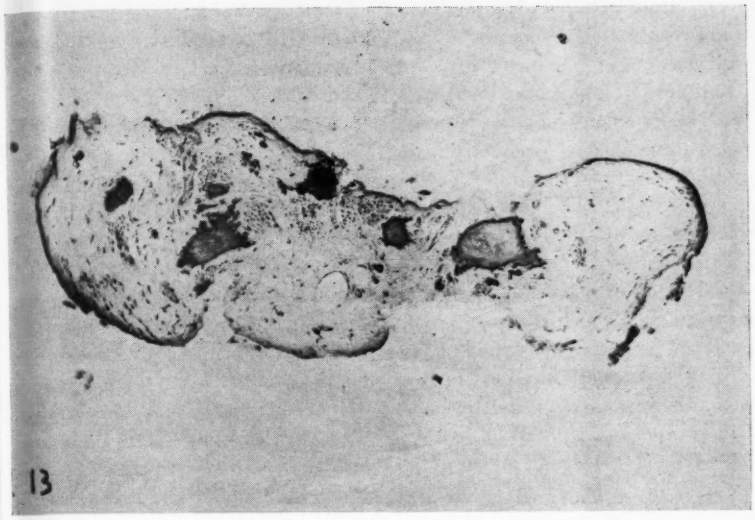
Resistant Factor Noted: Whereas in the former instance the capillaries were fragile, in this instance the capillaries and their endothelium are far more resistant and are not giving way to rupture and bleeding.

Catabolic Transformative Processes: This type of pathologic process is manifest in the ability of the endothelium to pass through various catabolic transformation processes. This not uncommon property of mesendermal connective tissue cells leads to final disaster for the dental pulp structure and in the final stages renders the pulp entirely useless as a nutritive organ. Also there are accompanying symptoms during change cycles.

Capillary Changes in First Stage: Examination of a pulp section in the first stage shows certain of the capillaries to be enlarged. After enlargement, however, an influence through the vasoneuro mechanisms causes the capillary walls to change volumetrically so that this influence acts as a chemico-electric stimulant and thereby induces the endothelium to change functionally, on a defensive basis. Cells which do change are genetically weak, for all the endothelial cells do not change and only certain ones are affected:

(1) The first change is toward fibrosis, and as the cell becomes weaker it takes upon itself a chondromal characteristic.

(2) From a fibroblastic stage the transformation of the affected endothelial cell results in a chondrocyte. During this stage the section will show a thickening of the endothelium which continues to engulf the affected capillary. These thickenings continue to grow, engulfing adjacent capillar-



13. ***Number of chondromal plugs in bicuspid pulp section. Note capillary remnant in each formation. Some plugs show more than one capillary remnant engulfed in plug mass.***

ies, and finally forming a large plug of cartilagenous substances.

(3) A further stimulant to the growth process results from a diminished blood flow to the area. When this happens the perivascular cells, such as the histocytes, appear to gather about the endothelial structure involved and join in establishing collagenous material, along with the endothelial cells during their final stages of transformation into collagenous and finally calcific substance.

(4) The release of blood chemicals and cell enzymes is another stimulant to the plug growth. This probably results initially from an upset in the oxygen level during capillary cut-off and cell catabolisis.

Presence of Chondromal Substance: Figure 13 illustrates in a bicuspid pulp a number of plugs of chondromal substances in various stages of formation. Careful study of this section will demonstrate the enlarging and engulfing chondromal masses forming about the affected capillaries. In a publication in 1951[1] a greatly enlarged section is shown in which can be seen the types of cells involved in these processes and also the beginnings of the thickening about certain capillary walls. A comparison of the pathologic to the normal pulp is shown in an adjoining photomicrograph.

Process Continues: After these large plugs are formed, the process does not terminate but continues into the third (coteific) stage. During this second stage x-ray determinations are not of much help as the pulp chambers remain clear. Microtoming for sections may be done during this stage.

The Second Stage—Pain may or may not be present in this stage. Predominantly little pain is experienced, but many involved teeth will feel uncomfortable because of the subnormal nutritive changes of the pulp which occur as the capillaries are pinched off.

Long-term Development: If, by test, capillary fragility is ruled out and teeth remain uncomfortable, it is probable that the second type of catabolisis is in progress. The time of development of this stage is not short term, in fact some years may intervene.

Emotional Traits may be Inherited: Other factors to note in this second stage of symptoms are the patient's emotional status and the family history to determine whether dominant traits or similar symptoms were experienced among parental members.

[1]Mellors, Newton W., and Herms, Frederick W.: Investigation of Neuropathologic Manifestations of Oral Tissue, Am. J. Orthodont. **37**:1 (January) 1951.

Third Stage of Long-Term Pulp Catabolisis

During the third stage the clinical picture changes again. Pain is the more pronounced symptom, usually becoming intense as the pathologic processes of the pulp continue. Not only are the teeth in question tender at times, but pain symptoms may also be manifest in more remote regions, such as the shoulders, back of the neck, and in the occipital regions of the head. Headaches are not uncommon. The eyes and ears may also be involved.

Possible Source of Irritation—Ramifications of the fifth nerve and its numerous synaptic relationships which might register sensations in others of the twelve cranial nerves, are difficult to trace directly. However, when irritations arise from a dental source (such as pulp stone formations) pain often manifests itself among the other twelve cranial nerves. The ones most affected are the second, third, fourth, seventh, and eighth. Others may also be affected but those enumerated with the fifth, are the more common. Diagnostically, when pain or functional changes appear in these neural tracts, it may be well to evaluate the possibility that dental pulp stones may be the source of irritation.

Calcific Formation — The pathologic process of the third stage relates almost entirely to calcific formations within the dental pulp matrix. X-ray study will disclose opacities within the pulp chambers of affected teeth. The areas within the pulps affected vary in size and contain calcific bodies from minute formations to those sufficiently large to fill and obliterate the entire pulp chamber and even the pulp canals. During formation there is an advancement, stage by stage, from the initial fibrosed thickening about the capillary walls through the chondromal stage and, finally, the calcific stage.

Different Chromosologic Order—The polarizing microscope defines a different chromosologic order of the pulp stone from that of primary or secondary dentine: (1) Under crossed polars the color of the stones in thin cross section of .003 inches, defines a

substance almost colorless, as against the dentines having more color in the yellows and grays. (2) Rather pronounced are black lines, irregular in shape but forming a somewhat concentric pattern, indicating that the stone is formed in layers.

Stone of Mesendermal Origin—Some stones have been observed that appear more homogeneous than others but with other dot and broken line formations. These stones are of mesendermal origin and might be considered a connective tissue modification. Their characteristics are singular in that they differ from primary or secondary dentine or bone. Basically they arise as an apatite. They change in structural formula, however, from apatite which basically bears the elemental combination of $3Ca_3\ (PO_4)_2CaF_2$. This structure occurs as minute crystals of the hexagonal system, optically negative and having a refractive index spectrum of 1.630 to 1.651. The birefringence is weak N_W - N_e - 0.003 to 0.004. Employing monochromatic sodium light the interference colors are first-order gray to white. Between crossed polars, sections are dark.

Change in Apatite Crystal: As time stretches into years from the period of the first calcific formation the apatite crystal changes and resembles more an amorphous calcium carbonophosphate with a formula of $3Ca_3\ (PO_4)_2.nca(CO_3F_20)\ (H_20)X$. This structure resembles collophane. Certain distinguishing features make the substance appear more transparent with a white or slightly yellow color.

Possible Likeness to Endothelial Cell Changes: The birefringence characteristics indicate a weak response, about 0.005. While this mineral is dominant in fossil bone, it bears a similarity to the substance found in aging pulp stones. This would indicate that the underlying developmental sequences are probably common to endothelial cell changes in which the normal metabolism of the calcium and phosphorus ratio is peculiarly changed. If this is so, it is not consistent with changes commonly known, for example, those phenomena resulting from parathyroid upsets.

Transformation Processes Appear Well Designed: The mechanisms of action which interrelate inheritance and emotion as channels through which these changes occur are being studied. The transformation processes appear well defined as they have been observed in histopathologic studies. The interesting factor that the index of refraction of aged pulp stones occurs consistently at 1.5483 seems to indicate an appearance of finality regarding the possibility of further change in structural formula.

Pulp Stones in Apposition to Dentine—Pulp stones do not attach to the true dentine, primary or secondary, but have a line of demarcation between the bodies. However, they are often in close apposition to those structures.

Comment

Stones may be Present With or Without Pathologic Changes—Enamel cavitations or periodontic problems are not important in the formation of pulp stones. They are found with and, many more times, without such pathologic changes.

Relief from Extraction of Affected Teeth—Cases have been observed in which these formations have progressed to a degree to become intolerable to the patient. Extractions of affected teeth gave immediate and permanent relief from neural symptoms.

Antibiotics of No Therapeutic Value—Bacteria do not enter into the picture, therefore antibiotics are not of therapeutic value in these cases.

Pressure Becomes Symptomatic—Built-up pressures resulting from developing pulp stones, occurring within the pulp chamber of teeth, become symptomatic as described.

Pulp Canal Therapy Ineffective—(1) Infection may be introduced in the process of pulp canal therapy, and (2) because of the unpredictable locations of the calcific deposits and their close adaptations to the pulp canal walls, they may not be dislodged even with acids, and, if pulp stones are removed, those deeply positioned may form another barrier.

Therapeutic Considerations

Sedatives, such as Propoxyphene hydrochloride 0.325 gram, or aspirin compounds with or without codeine in mild doses, 0.030 gram, are of short-term relief depending upon the extent of the stone involvement. Forty per cent of cases have responded to one or two of the tranquilizers, for example, Meprobamate (Miltown®, Equanil®) in dosage of 0.400 gram or Ultran® (a new Lilly product) in doses of 0.300 gram once or twice daily. In practice this dose is given once daily at 11:00 A.M. The reason is that the stomach is in most cases empty at this hour and it appears, according to the records, that emotional problems experienced by this type of patient begin to build up at that time. A few patients require a dose of the same amount before retiring.

Drugs of Choice—Darvon, Meprobamate (Miltown, or Equanil), or Ultran are the drugs of choice because side reactions from their use are rare. There is no evidence to indicate that they are habit forming.

Length of Treatment Period—One or the other of the tranquilizers may be used for a six-month period, then discontinued and the results observed. If the patient reverts to his former symptoms, extractions are considered. If pain does not return for six months after discontinuance of the drug, therapy is successful.

Adjunctive Measures—In the meantime, every measure is taken to advise the patient in dietary correction, to seek psychotherapy, or to obtain an internist's recommendations, should any of these be required. Most patients are responsive to any attempts at therapeutics. It is impossible to say that any therapy is the final answer; in fact many cases show remissions from time to time.

Summary

While science in therapeutics continues to contribute new drug agents, as well as a broader understanding of the pharmacodynamics of drug substances which fortify cells and cell components against destruction, mod-

(*Continued on page* 395)

The Simpler Approach to Partial and Full Fixed Prostheses Using the FULL COVERAGE *Restoration*

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DIGEST

The case history reported in this article demonstrates that most general practitioners can achieve the objectives of oral rehabilitation simply, scientifically, and successfully without costly equipment, multiple recordings and registration by complex anatomic articulators, or highly specialized skilled technicians within the office. The step-by-step directions presented are adaptable to the majority of reconstruction cases and should enable more dentists to perform and more patients to receive a complete dental service that not only replaces teeth that are missing but preserves those that are remaining. Dentists fami'iar with the various theories on occlusal and periodontal therapy will welcome a practical approach to the treatment necessary to restore the mouth to optimum health, maximum function, and pleasing esthetics.

Case History

In a woman patient, age 39, clinical and x-ray examinations revealed the following conditions:

Mandible — (1) Three posterior teeth on the right and left lower jaws were only partly erupted with short crowns and amalgam restorations on several surfaces.

(2) Only the second molars on both sides were in light occlusal contact.

(3) The patient had been wearing a cast partial denture with occlusal onlays over the remaining natural teeth, constructed in an attempt to establish a functional occlusal plane.

(4) Recurrent caries was present around the existing restorations. There were also many areas of erosion and decalcification (Figs. 1, and 2).

(5) A marginal periodontitis was present with deep pockets, bleeding, some mobility of the bicuspids and first molars, resorption of the alveolar crest, and widening of the lamina dura.

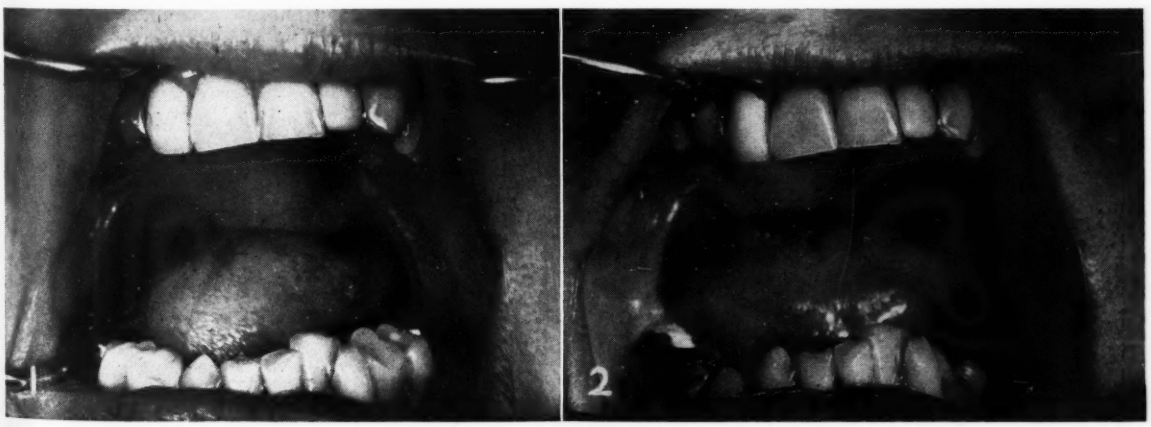
(6) The gingiva around the anterior teeth in particular was red, puffy, soft, shiny, with formation of clefts beginning.

Maxilla—(1) All the teeth present had multiple and varied restorations; that is, amalgams, silicates, and acrylic restorations covering in many instances four surfaces of the same tooth.

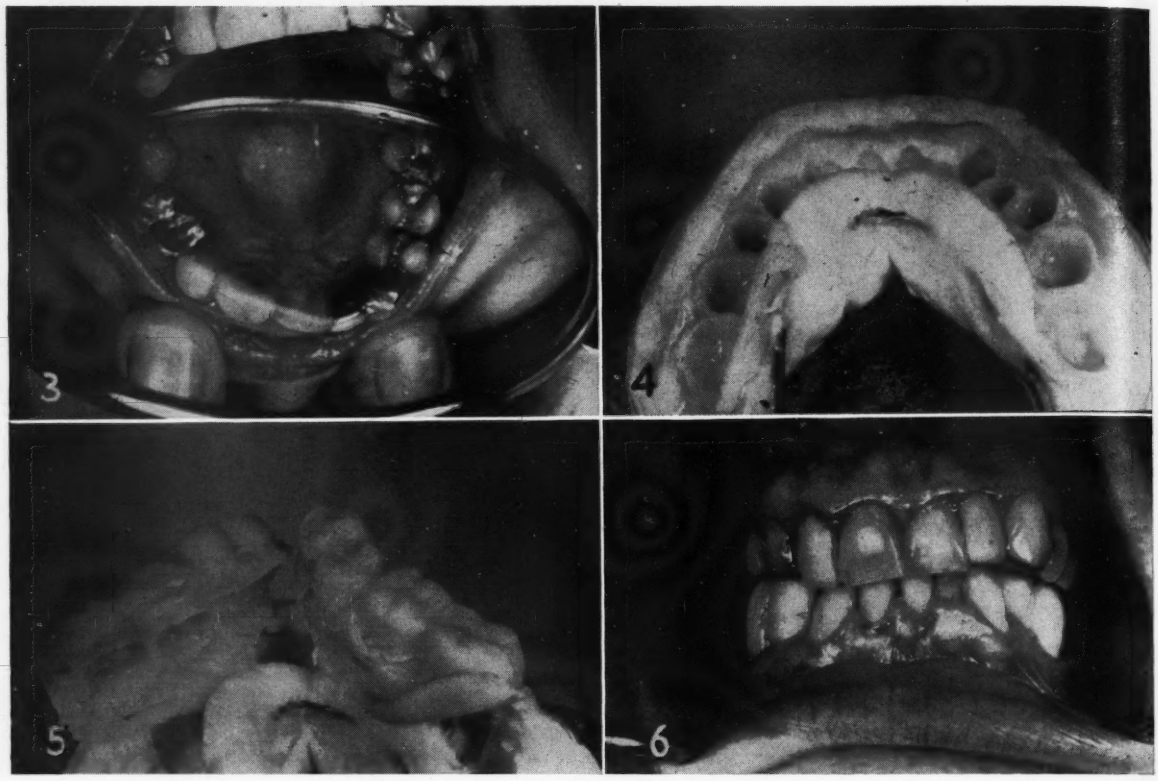
(2) The upper right first and second incisors were pulpless. There was cuspid impaction in the palate.

(3) A two-unit fixed bridge was present on the right and left side with recurrent caries around the inlay abutments.

(4) The existing freeway space of 2 millimeters was maintained. There was a marked distortion of the an-



1. *and* **2.** *Mouth conditions before treatment.*



3. *Upper jaw before treatment.*
4. *Temporary acrylic splints within hydrocolloid impression.*
5. *Untrimmed acrylic splints removed from hydrocolloid impression.*
6. *Temporary splints cemented with "access" cement.*

terior teeth alinement resulting in a distorted smile. The patient was extremely self-conscious about this and its effect on her personality was obvious.

Treatment Procedure

The treatment plan was to use full coverage veneer crowns as the restorations of choice, splinting all veneers on the lower except the second molars, since these were to oppose natural maxillary second molars, thereby exerting less occlusal stress on these teeth than if they were incorporated in a lower fixed splint. The lower restorations were completed first to establish normal crown height and an ideal working occlusal plane.

Technique — The following steps were taken:

1. A hydrocolloid impression was taken of the lower jaw with the patient's old removable partial splint in place.

2. Within the same day, the lower right and left quadrants were prepared completely with all margins located subgingivally. Note that the variations in the depth of the gingival crevice precludes an arbitrary setting of all crown margins at a fixed distance under the gingiva.[1]

3. Temporary immediate-setting plastic splints were constructed by filling an acrylic mix into the posterior teeth quadrants of the hydrocolloid impression. This was then seated in position in the mouth over the prepared teeth.

4. Using some of the excess mix as a test piece the impression was removed before the acrylic had completely set (Fig. 4). The splints were carefully removed from the impression (Fig. 5), excess trimmed, dropped in cold water one minute, and returned to the mouth for continued setting. The patient was allowed to rinse frequently until setting was complete.

5. These splints are cemented in place with the same "access cement"* used for final restorations (Fig. 6). The patient's original vertical dimension is unaltered and in addition to the many other advantages of temporary acrylic splints, a duplicated record has been obtained with maintenance of freeway space.

Taking the Impression — 1. Annealed copper bands, carefully festooned and marked, showing the amount of extension subgingivally are filled with cylindrical impression wax.

2. The band is forced down over the tooth ahead of the impression

[1]Selberg, A.: A Full Crown Technique, J. Pros. D. **7**:102-122 (January) 1957.

*The term "access cement" is used because this type of cement provides easy access to the prepared teeth at any time after the bridge is cemented in place. The formula for the access cement described in this article is one-third Ward's Wondrpak cement powder mixed with two-thirds of zinc oxide powder. The liquid used to mix the powder consists of one-third Ward's colorless Wondrpak liquid and two-thirds eugenol.

7. ***Acrylic transfer copings made directly on copper-plated dies by pouring into a paper matrix held by a paper clip.***

Registration—Having already established the desired vertical and correct centric relation with the temporary splints double check in the following manner:

1. Using the Tobey Vertical Dimension Gauge with a setting at zero on the millimeter scale, two dots are placed on the patient's face, the upper dot made by upper point alongside the ala of the nose and the lower dot made by lower point with instrument held vertically and perpendicular to the face. This first marking is made with the patient's jaws in physiologic rest position (Fig. 8).

2. These markings are made in this position rather than at tip of the nose to chin for two reasons: (A) A more accurate measurement can be made and determined where reference

8. ***Markings made with Vertical Dimension Gauge. Jaw in physiologic rest position.***

9. ***Centric occlusion position. Gauge points are adjusted to coincide with dots. Reading on millimeter scale is an accurate measurement of freeway space.***

material to its pre-fitted position. The material is compressed with steady finger pressure, forcing the material into the confines of the band until the excess escapes gingivally.

3. Chill thoroughly with cold water and remove.

Dies and Transfer Copings—Copper-plated dies were made from the band impressions. Upon these dies acrylic transfer copings are easily, accurately, and quickly made (Fig. 7).

Centric Relation and Vertical Bite

10. ***Rebased unilateral wax check bites, transfer copings in plaster impression.***

points are in the same straight plane. (B) The measurement in the first bicuspid area gives a truer average of the freeway space. A freeway space determined in nose-chin relationship will be greater in this area than the freeway space found in the posterior molar region. Since it is necessary to know the freeway space existing in the given jaw relationship, measurement is therefore taken in that area where the mean or average will be found.

3. After registering markings in physiologic rest position the patient is made to close in centric,[2] and with teeth in occlusion, lips just touching, a gauge is placed so that the upper pointer coincides with the upper dot, and lower point is moved up to coincide with lower dot. Simply read the setting on the millimeter scale made by the lower pointer for an accurate measurement of the amount of the patient's freeway space (Fig. 9).

4. For articulation of models use unilateral wax check bites, that have been rebased with blue inlay wax on the tooth preparation side (Fig. 10).

Additional Steps — 1. Leaving the splint of one quadrant in position to serve as a stop and index for the correct vertical and centric, use carefully rolled pink baseplate wax for registration of the other side. Once hardened and chilled this is kept in position while a check bite is made of the opposite side.

2. Bites are rebased only to ensure more accurate relating and positioning of upper and lower working casts.

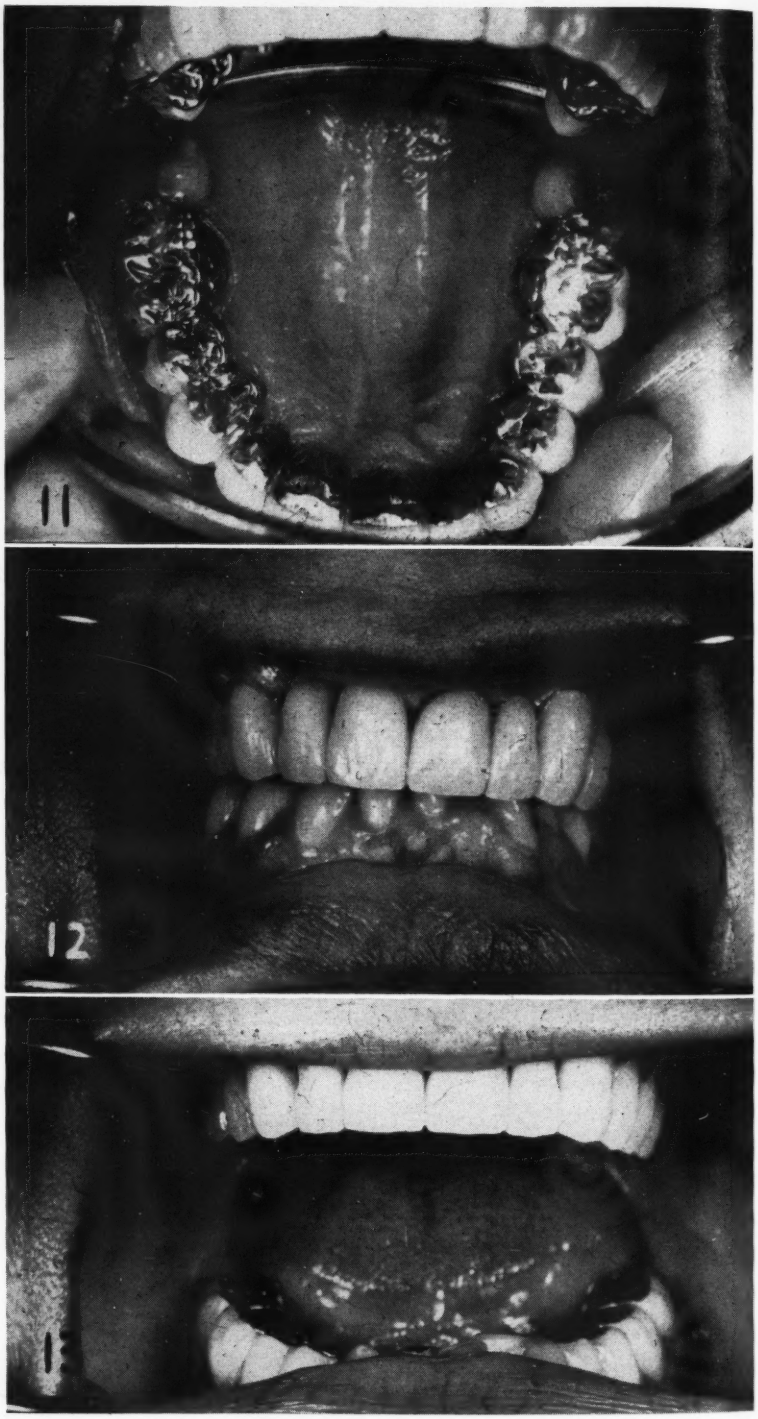
3. Using the gauge, the vertical and freeway space are checked. this time using the wax bites to establish occlusal position.

4. Dies are positioned into transfer copings, and set in the plaster impression.

5. A working model is poured.

6. The upper counter model and the lower are mounted on any simple articulator, (Stephans type C has proved most satisfactory), and the veneers are waxed and cast to an ideal occlusal plane. The existing upper occlusion is planed where any elongation or interferences may exist.

7. The veneer castings are returned to the mouth, fitted, the occlusion checked, and unilateral wax bites taken. A plaster impression is taken with the crowns in position. From this the master cast is made. The castings



11. ***Completed upper 11-unit bridge, palatal view.***
12 ***and*** **13.** ***After treatment, completed upper and lower restorations.***

[2]Standard, S. G., and Lepley, James B.: The Freeway Space and its Relation to the Temporomandibular Articulation, J. Pros. D. **5**:20-32 (January) 1957.

on each side are splinted, rechecked, and completed as acrylic veneers.

Cementation of Fixed Restorations—The completed lower restorations are cemented with "access" cement which offers (1) ideal retention, (2) less likelihood of washing out, (3) complete anodyne effect on prepared teeth, and (4) assures ease of removal of restorations.

The author finds that the use of the term "access" cement is psychologically and practically a more appropriate term than "temporary" cement. The bridges are considered completed when placed with "access" cement. Since there are many cases as in spans of 10 to 14 units where the bridges are not cemented with zincoxyphosphate cement for periods of one to three years, use of the term temporary cement may connote to the patient incompleted or unfinished bridges.

Procedure for Upper Bridge

1. A hydrocolloid impression was made of the upper anterior prior to the removal of right central, lateral, and the cuspid impaction.

2. Adjacent abutment teeth were prepared first, surgery was performed, and the acrylic splint inserted at the same sitting.

3. While healing progressed, all remaining teeth except the second molars were prepared in quadrants. Impressions, dies, transfers, fittings, and full mouth plaster impressions, were performed as on the lower.

4. Centric and vertical were rechecked to the new lower occlusion.

5. The upper jaw completed as an eleven-unit fixed bridge was also cemented with "access" cement (Figs. 11, 12, and 13).

6. The completed restorations are checked and adjusted for any prematurities in centric. Interferences on both working and balancing sides should be removed. Maximum cuspal harmony in the lateral ranges with a resultant occlusal balance is desirable and ideal.

7. Final spot grinding, milling in, and occlusal balancing is performed in the mouth. The articulator best adapted to each patient, is his own. It is time that the *natural* articulator was used more and imitated less.

Conclusions

A technique and procedure has been described for restoring broken down teeth in a crippled, distorted occlusion. This was accomplished simply, scientifically, and logically. The technique makes it possible for the patient to be comfortable throughout the course of treatment. The dentist is able to maintain with ease the desired and correct vertical dimension and centric using unilateral rebased wax bites and a vertical dimension gauge. Use of the cast gold crown with porcelain or acrylic as the veneer offers the most durable, esthetic, and functional restoration. The entire procedure of occlusal reconstruction can be accomplished without the need for any more equipment or materials than is found in the average dental office.

40 *Somerset Street*

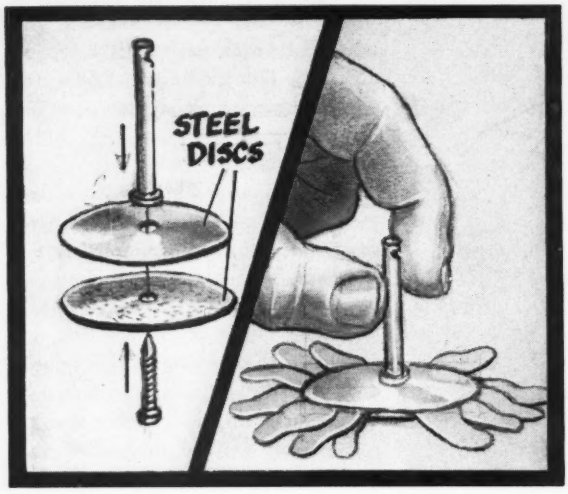
Investigation of Neuropathologic Manifestations of Oral Tissues: Inheritance and Emotion as Related to Tooth Structure Breakdown

(*Continued from page* 390)

ern dental research is still seeking to explain the basic cell processes underlying certain disorders accelerated by emotional syndromes.

The research presented here continues to prove that (1) the primary cause of periodontal disease, dental caries, and tooth pulp catabolisis is an inheritance characteristic, prenatally established with weakness patterns appearing within the defensive mechanisms of cells and their organella, and that (2) from birth on, persistent emotional stresses received through the nervous system, adversely influence vasomotor control of the capillaries, allowing too much or too little nutriment to flow to or away from adjacent connective tissues; the stroma of the dental pulp, for example. Any capillary endothelium or connective tissue inherently weak is found to be the first to break down under imposed vascular stresses, constituting the strongest factor predisposing such cells to final destruction. It follows that bacteria are considered not to be the primary cause for tissue breakdown, but mere opportunistic invaders consequent upon a primary catabolic autolysis or inadequate cell defense. Studies are included of both emotionally stable patients in private practice and emotionally disturbed patients hospitalized at the Napa State Hospital at Imola, California, a neuropsychiatric institution.

1607 *McAllister Street*



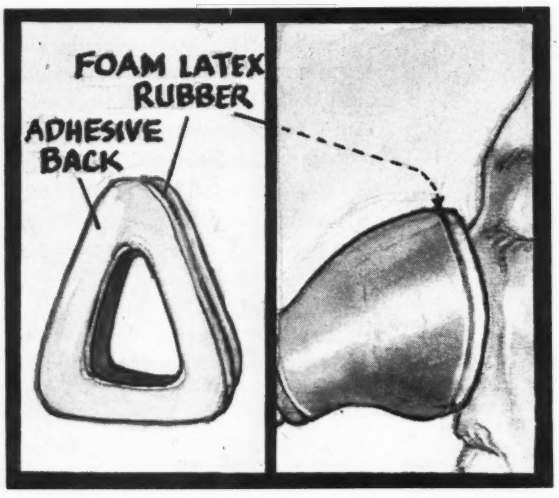
1

Clinical and Laborator

Storage of Matrix Bands

Bruce L. Shrallow, D.D.S., Germantown, New York

1. Metal matrix bands may be stored between two safe-sided discs held together on a short mandrel. The abrasive sides of the discs are in contact. Individual bands may be removed or replaced on this holder without disturbing the others.

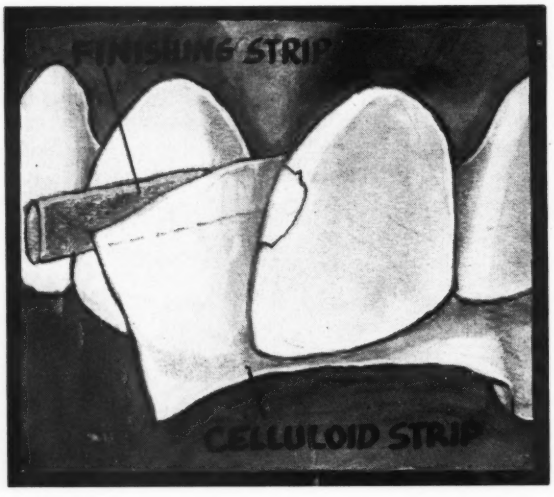


2

Liner and Repair of Nosepiece

A. H. Horowitz, D.D.S., Brooklyn, New York

2. The nosepiece of an analgesic machine may be lined with a piece of Scholl's adhesive latex foam rubber cut to proper size.



3

Placement of Silicate Restorations

David Cohen, D.D.S., Washington, D. C.

3. Before the placement of an anterior silicate restoration, wedge a sandpaper strip between the celluloid strip and the proximating tooth at the gingival margin. This will minimize excess material at the gingival and will facilitate polishing the gingival margin after the removal of the celluloid strip.

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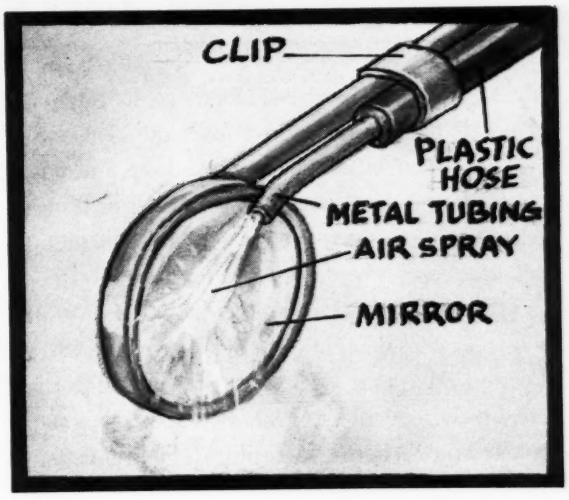
SUGGESTIONS . . .

Maintaining Visibility with Water Spray

H. M. Schiff, D.D.S., Astoria, L. I., New York

4. When working with the Hanau automatic water spray an air line may be clipped to the mirror, from the automatic air supply, so that a constant spray of air keeps the mirror clear of water.

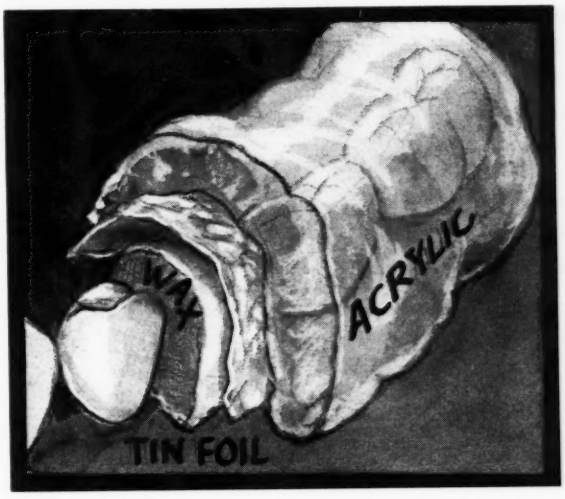


4

Impression Tray for Rubber Materials

Richard M. Adams, D.D.S., Chatham, Massachusetts

5. Construct custom-built tray for rubber impression materials by using three millimeters of red carding wax over the teeth to be prepared. Add a layer of foil and over this a piece of plastic tray material. The wax peels out evenly. The acrylic on the adjacent teeth acts as a "stop."

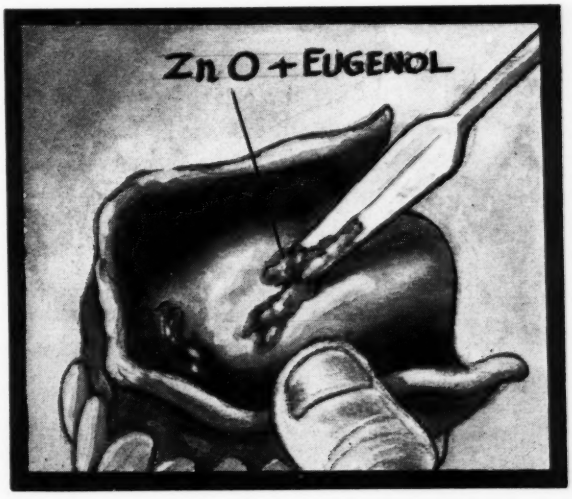


5

Allaying Pain and Increasing Retention In an Immediate Denture

John M. Battle, D.D.S., Tampa, Florida

6. A mixture of zinc oxide-eugenol placed in the anterior palatal area of an immediate denture acts as a sedative and analgesic and as a reline to increase retention.



6

technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time.

Send your ideas to Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

The EDITOR'S *Page*

ANYONE who has practiced dentistry long enough can recall patients who died after the removal of teeth. The death might not be immediate, but might have followed the surgical trauma after several weeks. The classical explanation has been that the death was caused by sepsis produced by the liberation of bacteria into the blood stream. The liberated organisms were thought to be carried from the tooth socket to lodge in a vital part and then establish a secondary infection. The cases of subacute bacterial endocarditis occurring after dental surgery have followed this pattern.

Not all deaths following surgery in the mouth can be explained on this bacteriologic basis. Death after *any* kind of trauma in older patients is more likely to be caused by myocardial infarction or cerebrovascular accident. The trauma, either intentional by surgery or accidental, in persons with preexisting damage in their cardiovascular mechanism produced a change in the dynamics of the circulation that may be a prelude to either cardiac or cerebral infarction.

A British and an American surgeon have reviewed in detail the protocols of 30 persons who died within one month following trauma. Although none of these deaths was the result of oral surgery, the biologic mechanisms are the same in surgery or trauma in *any* part of the body and this definitely includes the mouth.

This is the explanation of these complications as advanced by Vowles and Howard:[1]

"A review of 30 patients who experienced cardiac or cerebral infarction during the 30 days following operation or accidental trauma suggests a biologic difference between these two processes. Of the cardiac infarctions, 63 per cent occurred during the operation or within the first three days after operation or injury. All but 23 per cent occurred within the first week. To the contrary, the cerebrovascular accidents occurred without apparent predilection of time.

"A period of hypotension was known to be associated with operation in 52 per cent of the patients. Hypotension is known to result in a reduction in coronary flow. In the arteriosclerotic patient, whose coronary arteries are unable to dilate appreciably, the reduction in flow following hypotension is probably a major factor in the progression of ischemia.

"The complications could not be related to the anesthetic agents used; indeed, eight followed the use of local analgesia. One patient received no anesthetic (fractured humerus).

"The increased oxygen requirements of the burdened heart, associated with the decreased coronary flow of hypotension, predispose it to an immediate oxygen deficiency. General anesthesia reduced the oxygen demands of the brain so that an absolute oxygen deficit is as likely to be postoperative (atelectasis, narcotic respiratory depression, postural changes) as operative.

"An urgent need is the rejection of the surgeon's concept that most of these complications are inevitable. Application and extension of the recognized principles of avoidance of anoxia, hypotension, and increased cardiac work in arteriosclerotic patients should prevent many of the myocardial infarctions. The biologic and clinical factors underlying cerebrovascular accidents differ in not being specifically related to the period of trauma; attempted prevention necessitates the empirical application of such measures as adequate oxygenation, inhalation of carbon dioxide, and the avoidance of undue sedation in arteriosclerotic patients."

Because more people are receiving adequate dental care in their youth and furthermore, because more persons are living into the "arteriosclerotic age" we may expect an increase in the age of the group coming for exodontia. If we wish to practice with enlightenment we will make an effort to work with the physician in evaluating the circulatory status of these older persons before we undertake tooth removal for them. In many cases the oral surgery should be performed in the hospital rather than in the dental office.

[1]Vowles, Keith D. J., and Howard, John M.: Myocardial and Cerebral Infarctions as Postoperative Complications, British M. J. **5079**:1099 (May 10) 1958.

MEDICINE and the Biologic Sciences

Hemangiomas in Children

Hemangiomas may be found in the skin and subcutaneous tissues of any region. Only rarely do hemangiomas of other organs accompany the cutaneous lesions.

The most common hemangiomas are strawberry marks and cavernous lesions. Generally, roentgen-ray therapy is preferred for these. In selected patients surgery, carbon dioxide, sclerosing agents, and electrical coagulation or desiccation may be used.

Strawberry marks are almost always evident at birth. They are bright or purplish red, raised areas with well-delineated margins. Rapid growth is common during the first few months of life. The lesions may then become stationary, regress spontaneously or, occasionally, grow rapidly, causing widespread tissue destruction and disfigurement.

Since biopsies made during the period of rapid growth often reveal endothelial overgrowth, malignant disease may be erroneously diagnosed. The apparent growth is due to canalization and establishment of blood flow in the malformation, not to cellular proliferation.

If spontaneous regression is evident at the initial examination, treatment is not required. The lesion becomes dull and red and later, gray, after growth ceases. Infarction of deep feeder vessels probably causes regression and may lead to ulceration.

If the hemangioma is growing, regression should be initiated by treatment. Roentgen-ray therapy given to penetrate to the depth of the lesion is most satisfactory. Seldom are more than three treatments needed. A hemangioma may continue to grow for two months after treatment.

Cavernous hemangiomas may be seen alone or in conjunction with overlying capillary lesions. Pure cavernous lesions impart a bluish discoloration to the overlying skin. Biopsy may be necessary for diagnosis. The tumor may grow rapidly during early life or slowly and almost indefinitely. Spontaneous regression is rare.

Roentgen-ray treatments at intervals of six months or a year are recommended. Redundant tissue remaining two or three years after radiation therapy may be excised. If the lesion is pedunculated or well demarcated surgery may be done initially. Excision of a large lesion may cause considerable blood loss. If involvement of adjacent tissues is not accurately estimated, incomplete excision and recurrence are likely.

Sometimes flat, pink, often extensive intradermal capillary lesions may occur on the forehead, eyelids, and neck of newborn infants. The salmon patch generally fades within a few months. Some staining may persist at the base of the neck or show up in later life when blood pressure is raised. Treatment is not necessary.

MacCollum, Donald W., and Martin, Lester W.: Hemangiomas in Infancy and Childhood, S. Clin. North America **36**:1647-1663 (*December*) 1956.

Hypertension—Neurologic Manifestations

One of the common manifestations of hypertension is damage to the nervous system. Usually the first neurologic episode occurs in the fifth or sixth decade. It occurs later in men than in women.

Although headache is a common symptom, it cannot be considered a specific neurologic manifestation. Generally, the headache is bursting or throbbing in character and frontal or occipital in site. It is worse on arising in the morning. Nausea is commonly associated. Headache and blood pressure levels are not clearly related.

About 60 per cent of the patients experience prolonged disturbances of the mental state, including impairment of consciousness. Severe affection may result in progressive dementia. Multiple areas of cerebral softening, usually small in size and distributed mainly in and near the basal ganglia, cause personality changes, emotional lability, memory defects, confusion, and pseudobulbar palsy. Patients are generally in the 60's and arteriosclerosis may be an important factor. Again the height of blood pressure cannot be correlated with the severity of symptoms.

During the malignant phase, about 40 per cent of patients experience dizziness. The condition is not severe and does not persist for long periods. Dizziness is considered premonitory of neurologic complications but is not of value in predicting the form of nerve damage.

Renal failure and hypertension combined produce convulsions more often than either alone. Patients are generally in the younger age group. Survival after the first episode is usually about three months.

In many patients, acute cerebrovascular attacks occur frequently. These may be due to focal brain ischemia, intracerebral hemorrhage, primary subarachnoid hemorrhage, or hypertensive encephalopathy. Focal brain ischemia with infarction represents the end-result of throm-

bosis, embolism, or local insufficiency.

Life may be prolonged in patients with malignant hypertension and neurologic manifestations if renal damage is not severe at the start of therapy. Ganglioplegic drugs seem to be more effective than sympathectomy as treatment.

Clarke, Edwin, and Murphy, Edmond A.: Neurological Manifestations of Malignant Hypertension, Brit. M. J. **5005**:1319-1326 (*November*) 1956.

Pregnant Cardiac Patient

An understanding of the circulatory changes that occur is necessary for the successful management of the problem of pregnancy with heart disease. The diaphragm is elevated and the heart outline is changed to one of transverse widening with a decrease in length. The change in configuration produces physiologic alterations in the heart sounds. Hemic murmurs may arise as a result of increased anemia.

The lungs are not compressed because of elevation of the diaphragm. The chest wall expands both laterally and anteroposteriorly, allowing as much room for the lung fields as previously. The vital capacity actually increases about 5 per cent. Early decompensation is detected by a decrease in the vital capacity.

The augmented blood volume is an important factor in the total amount of work required of the heart during pregnancy. The cardiac output is greatest at the twenty-eighth week, then declines until labor starts. A second increase at this time does not diminish until six to eight weeks after delivery.

When cardiac disease is detected the advice of a cardiologist is required. An electrocardiogram, exercise tests and evaluation of reserve and severity of the heart disease are aids to management.

The hemoglobin should not be lower than 80 per cent. Chronic infection in the nasopharynx, teeth, or cervix must be eradicated and stress laid upon the need to avoid infectious contacts. The frequency of office visits should also be increased.

A reliable sign of occult edema is the weight. A gain of 15 pounds accounts for the weight of the infant, amniotic fluid, uterus, placenta, and increased blood volume. Any added weight increases the cardiac load.

The patient should rest at least nine hours a night and one hour in the afternoon with a reduction in exercise. Further limitation of activity depends on the patient's reaction and the severity of the disease.

Depending on the severity of the disease, the patient should be committed to the hospital one to several weeks before the expected date of confinement. Labor is not induced except for obstetric reasons. During labor, pulse rates over 100 and respirations over 24 to 26 suggest an early onset of decompensation.

During the first two days after delivery, cardiac work is as great as during labor. Ambulation should not be allowed until the sixth to tenth postpartum day. Sterilization is not recommended until six to eight weeks after delivery.

Kaltreider, D. Frank: The Management of the Pregnant Cardiac Patient, West Virginia M. J. **53**:11-15 (*January*) 1957.

Vesicular Eruptions of the Hands

The agents that can cause eruptions of the hands are many and varied. They may be of exogenous, endogenous, or psychic origin. Almost every known skin disease may produce lesions on the hands.

It is often difficult to determine whether an eruption is primarily vesicular. By the time the patient seeks medical aid, the vesicles may have become secondarily infected, may have disappeared leaving the skin encrusted and leathery, or they may be modified by self-medication or treatment.

The etiology may be suggested by the site of the initial appearance of the lesions. The location of the lesions on the hand while not pathognomonic, is a valuable aid in the diagnosis of some dermatoses. The palmar surface is usually the site in dysidrosis, scabies, pustular bacterid, or contact dematitis. The dorsal surface is usually involved in yeast infections, nummular eczemas, dermatophytids, and physical allergy.

Many eruptions of the hands are of internal origin, of the "id" type. They are caused by absorption and dissemination of products of metabolism from infections of various types in other parts of the body. Probably the most typical example is the dermatophytid resulting from dermatophytosis on some other part of the body. An active fungous infection of the feet will often give rise to vesicular eruptions on the palmar surfaces of the fingers and hands.

Bacterial infections of teeth, tonsils, sinuses, cervix, or prostate may produce id-type vesicular eruptions on the hands. They usually appear on the thenar and hypothenar eminences. Elimination of the responsible foci of infection should cause a disappearance of the bacterids from the hands.

In some instances vesicular eruptions on the hands may be caused by the oral or parenteral administration of drugs such as penicillin, iodides, arsenic, or salicylates. Discontinuance of use of the drugs eliminates the eruptions.

Environmental contactants are frequent causes of eruptions on the hands. Many times the offending agent is not readily apparent. The sources of the contactants may be from occupational exposures, housekeeping, clothing and jewelry, hobbies, cosmetics, food preparations, topically applied medicaments, or weeds and plants.

A number of factors have more or less significance in influencing eruptions on the hands. These are friction, xerosis, endocrine activity, avitaminoses, hydration, climate, psychic or emotional stress, and familial stigmas.

In dealing with vesicular eruptions of the hands it is wise to use the mildest form of therapy consistent

(*Continued on page* 403)

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1. *Microbiologic hazards of local dental anesthesia, I, Streitfeld, M. M., Zinner, D. D. J.A.D.A., 56:508, April 1958.*

2. *The Use of Povidone-Iodine as an Oral Antiseptic. Jablon, J. M., Zinner, D. D., Saslow, M. S., presented at Chicago meeting of the Society of American Bacteriologists, Chicago, May 1, 1958.*

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with good results. Usually therapy can be instituted immediately and before the etiology of the dermatitis is determined, since it will not interfere in the subsequent diagnostic procedures.

Johnson, Sture A. M.: Diagnosis and Treatment of Vesicular Eruptions of the Hands, JAMA **163**:1106-1111 (*March* 30) 1957.

Contra-Angles

Sputniks and Stomatology

We need not be reminded of the scientific advances made by the Russians in the physical sciences. In the biologic sciences the Russians are also accomplished. We have little information about the status of dentistry in the Soviet Union. From the *appearance* of the one dental journal that we receive on an exchange basis and from several dental books that have been sent to us as gifts from Russian dentists, I would have the impression that dentistry was not far advanced. But certainly the appearance of any publication can be deceiving. Some of the fanciest publications, such as the women's magazines and those in the home furnishing field, are filled with trivia. Conversely, some of the publications for the intellectuals are deadly in appearance but full of substance. The same may be the fact with the Russian dental publications.

Despite the humble look of the Russian journal one must be impressed with the subject matter that is covered. In the English index of the current issue of "Stomatology" the following subjects are included:

Therapeutic Section

Dentification Epithelium of Man in Ontogenesis

Hyaluronic Acid Content in the Dental Pulp

The Treatment of Milk Teeth with Chronic Periodontitis

Spectral Analysis Data of Hard Dental Tissues and the Alveolar Appendage of Man in Norm and in Parodontitis

Short-Focus X-ray Therapy of Leukoplakia Buccalis

Surgical Section

The Importance of Layer Roentgenography in the Study of the Facial Part of the Skull.

The Use of Wire Bone Sutures for Fixation of Fragments in Fractures of the Mandible

Filatov's Flap in Repeated Surgical Interference After Unsuccessful Operations for Clefts of the Hard and Soft Palate

Clinical Studies on Implantation of Artificial Teeth and Roots from Plastics

Retromolar Anesthesia of the Mandible

Differential Diagnosis of a Tuberculous Abscess of Soft Tissues of

"Seven Pointed Star Discovered"

Theoretical Filling Material Now A Reality

A hitherto unknown seven pointed star has been discovered in the constellation of Orion near the region of Betelgeuse, it was announced last week by the AMCO Mobile Observatory now in orbit circling Pluto. Analysis of telescanning spectrographs indicate the star contains phenomenal amounts of "Merdonite," the element most necessary in the formulation of the theoretically possible, all-purpose filling material—"Mer-Don 7."

Since all Astros-Dentists and the System Dental Society are vitally interested in this discovery, we present a summary of developments up to the present date:

D-240—An AMCO observatory announced the discovery of the seven pointed star with presence of "Merdonite."

D-241—Staff meeting at AMCO alerted entire corporation for full production of Mer-don 7. Two fully equipped AMCO stellar-disc labs and one freighter-disc were dispatched to seven pointed star — now named Merdon.

D-242—AMCO stellar-discs report Merdon is practically solid Merdonite and that freighter is returning to Earth fully loaded with its fabulous Merdonite cargo.

D-243—AMCO computers, working day and night since discovery, complete formulation of Mer-Don 7. Merdonite is unloaded at AMCO plant. Initial runs of Mer-Don 7 completed at production centre.

D-244—All AMCO Key Astros-Dentists and others selected from every part of the system test Mer-Don 7. Without exception, all report it to be the ultimate in theoretically possible filling materials.

D-245—Mer-Don 7 now available to all Astros-Dentists through regular Astros-Dealers. AMCO scientists recommend Anterior plus Posterior use.

How will these discoveries and developments influence the individual Astros-Dentist? What progress is in store for Astros-Dentistry? What new uses will be found for Mer-Don 7? Authentic case histories will be reported each month to keep you up to date on the scientific marvel of the galaxy, Mer-Don 7.

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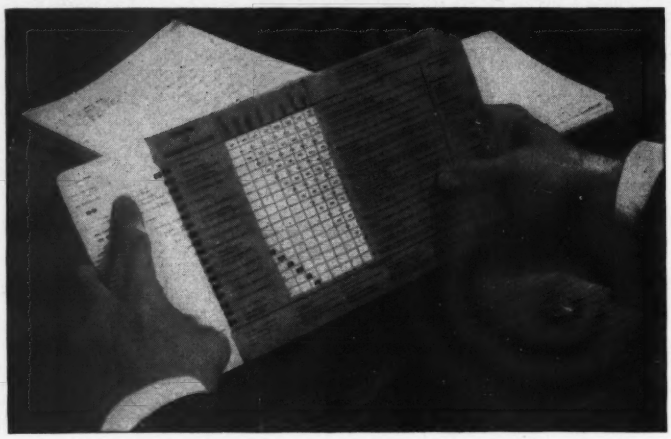

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the Zygomatic Region

The Mechanical Action of Instruments in Extraction of Teeth

Orthopedic Section

On Certain Methodological Problems in Orthopedic Stomatology

Oscillogram of Human Masticatory Muscles in the Act of Mastication (In norm and in loss of teeth)

Indications for the Use of Modern Orthopedic Devices in Osteoplastic Operations on the Mandible

Histological Changes in the Parodontium of Dog's Teeth Under the Effect of Functional Traumatic Overloading

The Influence of Extraction of Milk Molars on the Form of the Occlusive Surface of Permanent Dentition's Occlusion

The Use of a Metallic Frame with Pegs for the Fixation of the Prosthesis on a Toothless Mandible

Practical Notes and Essays

Two Instances with Abnormalities

Properties of Phosphate Cements

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A Case of Chronic Inflammation of the Submandibular Salivary Gland Due to an Intrusion of an Awn of Wheat

A Model of a Joint Clamp for Fixation of Fragments of the Mandible

Fracture of the Mandible in a Newborn

A Foreign Body (Needle) in the Alveolar Appendage of the Maxilla Penetrating into the Nasal Cavity

Asymptomatic Aspiration of a Metallic Dental Prosthesis

A Rare Case of Aspiration of a Bridgework into the Bronchus

A Simplified Method of Preparing Peg Teeth from Plastics

The Use of Magnets in Dental Prosthesis

How well each of these subjects is covered I have no way of knowing. I cannot read Russian. Our general ignorance of the Russian language represents a serious cultural lag. Many educated Russians are familiar with English, few educated Americans are familiar with Russian. Whatever appears in English publications in any of the sciences is almost immediately translated and made available to scientific workers in the USSR. Material that is published in Russia is seldom made available to scientists in other countries because there is a shortage of translators.

There is a jargon in dentistry and considerable of the "flavor" of any dental writing would be lost unless a translation was made by someone who was familiar with this particular jargon. An MOD, a jacket, a handpiece, an elevator, a partial, a pocket —these are among words that would be quite meaningless to a pure scholar who made a translation.

(*Continued on page* 411)

Of one thing I am quite sure; the biologic basis of dentistry in the Soviet Union would appear to be quite high. How skillful are the clinicians (most of whom are women) I have no way to know. I do not think, however that we should fall into the common and often unfortunate arrogant position that dentists in the United States often take: That is, to think that we are the only dentists in the world who have highly developed practical skills. That is not quite true. It is a myth that we have nurtured. We also hold similar myths concerning our mechanical skills in other fields. The Sputniks proved that our wishful thoughts were not facts. We should not fall into the same error in stomatology.

What Happened to Enterprise?

There is a recession, but there are not many signs that businessmen are trying to help themselves from the economic decline. They cry and whine and put out their hands to government for help but make few signs to do anything themselves. Prices stay high, salesmanship and service stay low. As an example, and you can name your own favorites, two weeks ago I called a floor covering outfit and told them we needed a little something here in the office in the way of vinyl tile. We are still waiting for the salesman to appear. Well not exactly, because after two weeks we called another company that responded promptly. We can be quite certain that the first company blames everybody but themselves for a decline in business.

We do not usually associate the head of one of the biggest advertising agencies for straight-from-the-shoulder talk. Advertising is made up of the gimmick, the smart slant, the slogan. It took more than ordinary courage for Mr. Charles H. Brown, President of Batten, Barton, Durstine and Osborne, Inc. to speak these vigorous words to the National Sales Executives:

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"I think—and I hope to God it is true—that our people are becoming

(*Continued on page* 412)

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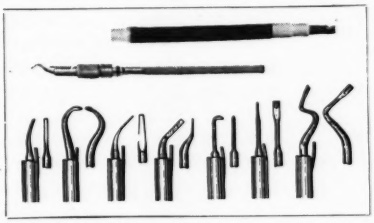

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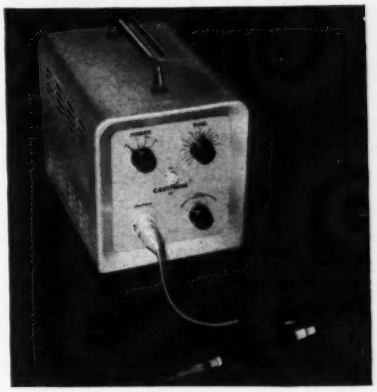

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sick of this goofing off. The reason I do not know, but I will guess that we are gradually beginning to realize that history is repeating itself. The Russians are doing a wonderful job as the barbarians in our modern historical drama. But we are far outdoing them in our superlative imitation of Rome. We may lack a few of the refinements of Rome's final decadence, but we do have the two-hour lunch, the three-day week-end, and the all-day coffee break. And, if you want to, you can buy for $275, a jewelled pill box with a built-in musical alarm that reminds you (but not too harshly) that it's time to take your tranquilizer.

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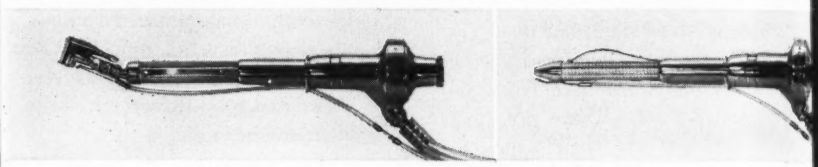

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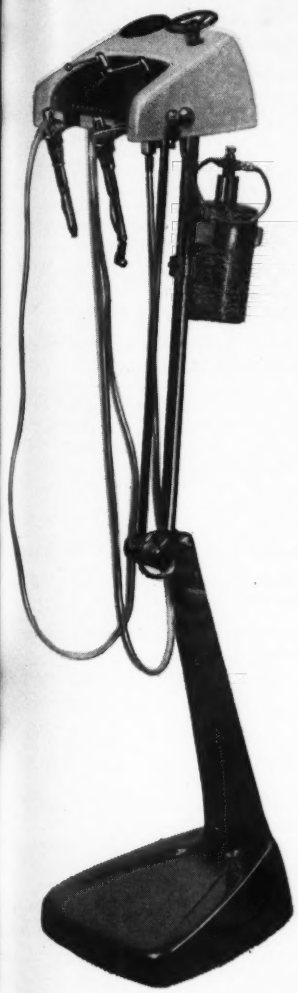
The Effects of the Retention of Roots Following Tooth Extraction

H. E. SIMPSON, M.D.S.*, Newcastle upon Tyne, England

Discussion and Conclusions

In 1928, investigating the healing of tooth sockets containing root remnants in dogs, it was found that when the root was not a physical obstacle, healing progressed normally. In 1947, using rats in similar experiments, it was also determined that proximity to the surface set up unfavorable complications. The specimens of root remnants in monkeys described here show similar effects.

Healing in the Absence of Pulp Specimens— It is believed that pulp remnants assisted the healing process but a specimen where the greater



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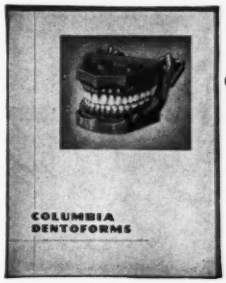

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Conclusions

The conclusions appear to be as follows:

(1) A large root fragment should be removed even if the pulp retains its vitality because it will undoubtedly be uncovered fairly rapidly by alveolar resorption if it is not already projecting above the level of the bone.

(2) Infected roots should be removed unless there are strong contraindications to this procedure.

(3) Apical fragments of uninfected teeth lying deep in the bone and surrounded by normal tissues are probably harmless although they may be uncovered after many years by alveolar resorption.

Adapted from *Journal of the Canadian Dental Association* **24**:234 (June) 1958.

*Sutherland Dental School

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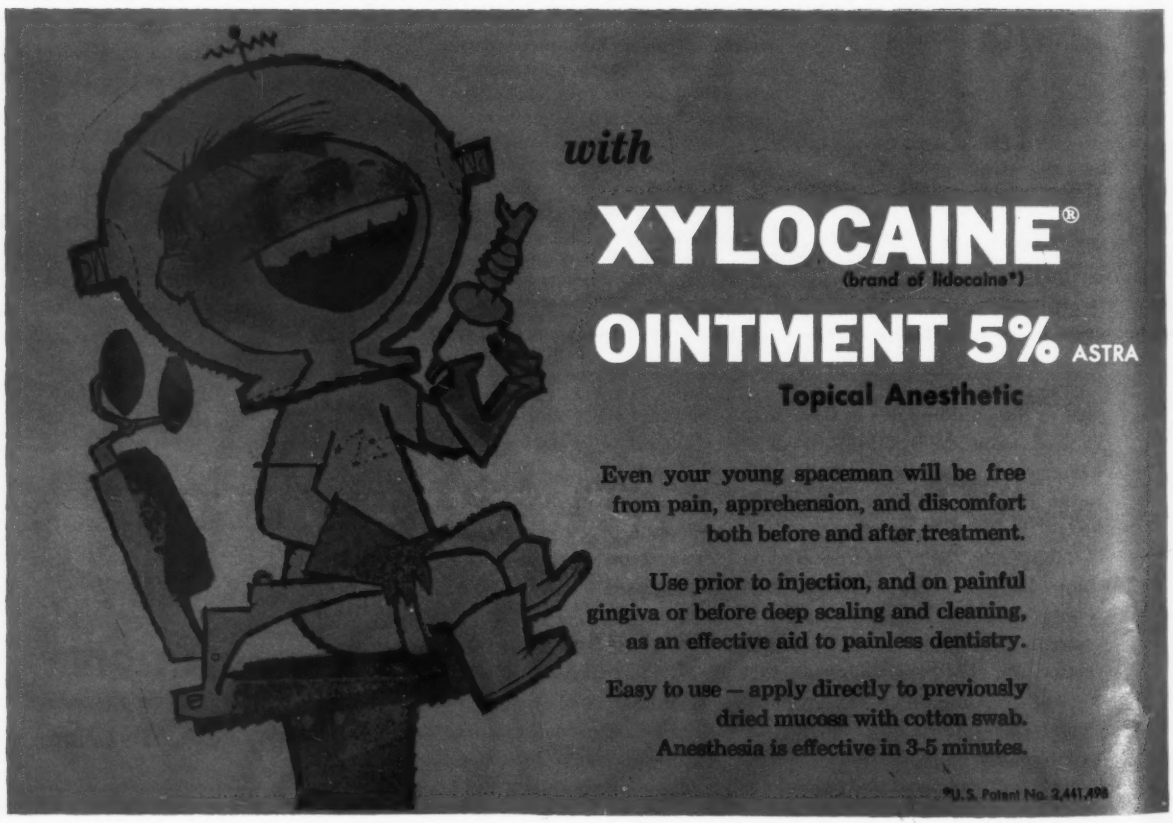
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